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by

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ABSTRACT

DIRECT-TO-CONSUMER ADVERTISING OF PRESCRIPTION DRUGS AND CONSUMER PRICES OF DRUGS: AN APPLICATION OF THE DUAL-STAGE THEORY

by

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Direct-to-consumer advertising is a relatively new form of promotion by prescription drug manufacturers, and there has been considerable controversy regarding the consumer-level effects of the practice. This study considers the effects of manufacturers' direct-to-consumer advertising on consumer prices of prescription drugs.

The research hypotheses are developed based on assumptions and definitions derived from the "dual-stage" theory, which describes a relationship between manufacturers' advertising and the gross retail margins of the advertised brands. The theory specifies that as brand manufacturers increase their differentiation efforts (through consumer-directed advertising, for instance), consumers are encouraged to purchase the advertised brands. This results in two phenomena: first, retail penetration (the number of retailers carrying the brand) increases, and second, retail margins decrease as competition among the retailers carrying the brands increases. In the case of prescription drugs, only the second phenomenon is relevant, since all drug retailers carry all brands. According to the theory, because retail margins are decreased, the price to the consumer is relatively lower for those advertised brands.

In the present study, retail margins for the advertised brands are measured before and after the initiation of direct-to-consumer

advertising. Further comparisons are made between the retail margins of the advertised brands with the retail margins of unadvertised brands.

Principal findings include a general validation of the dual-stage theory in this product category. As manufacturers initiated the consumer-directed advertising, retail margins for the advertised brands were observed to decrease significantly. When compared to the retail margins for unadvertised brands in the same therapeutic classes, the retail margins for the advertised brands were observed to decrease after the initiation of advertising. When compared to the average retail margins for the Top 120 brands of drugs, again retail margins decreased after the initiation of advertising for the advertised brands. Recommendations based on these results are developed for public policy, manufacturers, and marketing theorists.

"Those oft are stratagems which errors seem...."

- Alexander Pope

Dedicated to the memory of my late grandmother,

Carrie Huff, who said, "Get all the schooling

you can, 'cause that's something they can never take

away from you."

In more ways than one, she was right.

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CHAPTER I

INTRODUCTION

Prior to the 1980's, manufacturers of prescription drugs focused their promotional efforts only toward members of their distribution channels (pharmacists, hospitals, and physicians). However, in response to changes in the business environment and in the industry, several individual manufacturers have reacted by changing their marketing strategies. These changes have included direct-to-consumer advertising. The increasing number of pharmaceutical manufacturers who have begun to advertise directly to consumers has continued to create considerable controversy among various constituencies for the last decade (Alperstein and Peyrot 1993; Cohen 1988, 1990; Cutrer 1989; Deutsch 1989; Feisullin and Sause 1991; Johnstone 1992; Kaplar 1993; Marvinney 1992; Masson and Rubin 1988; Rosendahl 1992; Schwartz 1991; Suresh and Madhaven 1991). The arguments for and against the practice have focused on many factors, including the potential influences of manufacturers' advertising on consumer prices of prescription drugs (Brinberg and Morris 1987; Gladwell and Farhi 1990; Lober 1993; Pierpaoli 1986; Schondelmeyer and Thomas 1990; Schrader 1993; Sheffet and Kopp 1990; Staff Report 1984; Weidenbaum 1993).

Various observers have speculated that direct-to-consumer drug advertising may act to either increase, decrease, or not affect prices which the consumer pays, with no direct evidence to support any contentions. A more important question may be how manufacturers' direct-to-consumer advertising may modify the retail pricing decision, which in turn affects retail gross margins, thus affecting retail prices which consumers pay (Albion and Farris 1987; Norris 1984; Steiner 1984, 1991a).

This dissertation will develop and test a set of hypotheses which are derived from the "dual-stage theory," which describes a relationship between manufacturers' advertising and the gross retail margins of the advertised brands. Studies applying this theory in other product categories have provided strong evidence that manufacturers' efforts at brand differentiation, in the form of consumer advertising, lead to lower gross retail margins for the advertised brands, so that the differences among manufacturer prices are not necessarily reflected by differences among consumer prices (Albion 1983; Albion and Farris 1987; Leibermann and Ayal 1985; Nelson 1978; Steiner 1978). The present study will provide evidence that drug manufacturers' advertising which is directed toward consumers is associated with relatively lower retail margins for the advertised brands, and is therefore associated with relatively lower consumer prices. The results of the previous dual-stage theory research and a discussion of the structure and marketing practices of the pharmaceutical industry will provide the bases for the hypotheses.

PROBLEMS AND OBJECTIVES

If drug manufacturers advertise brands directly to consumers in a competitive manner, will this result in increased consumer prices? How does manufacturers' advertising of prescription drugs affect retail margins? How can this information help public policy decisions regarding direct-to-consumer advertising? This study will address some of the theoretical, managerial, and public policy issues associated with this promotional practice with the intent of providing some insight.

RESEARCH PROBLEM

The specific research problem to be addressed in this study is whether and to what degree the initiation of direct-to-consumer advertising is associated with lower retail gross margins. The mechanisms through which retail margins are relatively decreased, and therefore through which consumer prices are relatively decreased, are discussed in Chapter II. Previous applications of the dual-stage theory have provided strong evidence that manufacturers' brand advertising is associated with lower retail gross margins across a variety of product categories.

BUSINESS PROBLEM

This study will address issues of managerial relevance in its focus on the effects of manufacturers' advertising on retail margins. According to dual-stage theory, the manufacturer's advertising actually has two effects: first, the advertising stimulates demand among consumers, and second, the increased demand at the retail level actually increases retail competition. According to Farris and Albion (1980), the manufacturer should consider these margin-depressing effects in

developing an advertising budget. At the same time, retail pricing practices may be affected by the manufacturer's advertising. These dual-stage mechanisms are further described in Chapter II. Discussion in Chapter VI will consider the effects of manufacturers' direct-to-consumer advertising on decision-making at both the manufacturing and retail levels of the distribution channel.

PUBLIC POLICY PROBLEM

The pharmaceutical industry has been the subject of considerable regulatory scrutiny for several decades (Comanor 1964; Fletcher 1967; Jadlow 1972; Office of Technology Assessment 1993; Report 1961; Starr 1982; Temin 1979b). Most recently, drug manufacturers have been criticized for their pricing policies (Carey 1993; Clark 1993; "Do We Pay Too Much..." 1993; Pryor 1992; Tanouye 1994; Tanouye and Waldholz 1993; Tanouye 1993b; U.S. Government Accounting Office 1994; Waldholz 1992), as well as for their promotional activities (Gandy 1992; Kincaid 1992; ; Lober 1993; "Miracle Drugs or Media Drugs?" 1992; Staff Report 1994; Waud 1992). Congress has considered and passed legislation in attempts to curb price increases in the industry (Pharmaceuticals Access and Prudent Purchasing Act 1990; Possessions Wage Credit Act 1993; Prescription Drug Cost Containment Act 1991). At the same time, the Food and Drug Administration has expressed disapproval of direct-to-consumer advertising (Center for Drug Evaluation and Research 1990; Kessler and Pines 1990) and has considered restrictions on various advertising and other promotional activities (Colford and Mandese 1993; Noah 1992; "Pushing Drugs to Doctors" 1992). In response to the possibility of government interventions, drug makers have initiated

self-regulatory actions in their pricing practices (Tanouye 1993d; Waldholz 1993a; Waldholz 1993b; Weber 1993; Staff Report 1994), and currently adhere to the advertising standards which apply to medical journals.

Virtually all published empirical research regarding direct-to-consumer advertising has focused on the informational and communicational aspects of the advertising messages (e.g., Alperstein and Peyrot 1993; Brinberg and Morris 1987; Gilgore 1991; Morris 1984; Morris, Mazis, and Brinberg 1989; Perri and Dickson 1988; Perri and Nelson 1987; U.S. Government Accounting Office 1991). At the same time, however, debate has continued regarding the effects of direct-to-consumer advertising on consumer prices (Cohen 1988, 1990; Deutsch 1989; Gladwell and Farhi 1987; Hoff 1984; Masson 1991; Masson and Rubin 1986; Schrader 1993; Weidenbaum 1993). The present study is intended to provide insight into part of this debate, and to contribute information which may help in weighing the costs and benefits of the practice. Discussion will address the potential for relatively <u>lower</u> consumer prices of advertised brands as a result of manufacturers' direct-to-consumer advertising.

RESEARCH QUESTIONS AND HYPOTHESES

This research is directed toward answering the following general research questions:

1. What is the relationship between direct-to-consumer advertising and the gross margins which retailers receive for the advertised brands?

2. How can the knowledge of these relationships be applied toward managerial and public policy decision making in the prescription pharmaceutical industry?

The research hypotheses to be tested are:

Research hypothesis one:

For those brands of drugs which began advertising within the specified time horizon, the average retail brand gross margin decreases after the initiation of direct-to-consumer advertising.

Research hypothesis two:

The average retail brand gross margin for advertised brands decreases relative to the average retail brand gross margin for other (unadvertised) brands.

Research hypothesis three:
After the initiation of direct-to-consumer advertising, the average brand gross retail margins for advertised brands decrease relative to the average brand gross retail margins for other (unadvertised) brands within the same therapeutic class.

The theoretical bases for these hypotheses are presented in detail in Chapter II, the industry-based assumptions are defined in Chapter III, and specific development and statements of the hypotheses are presented in Chapter IV.

THE RESEARCH

VARIABLES TO BE EXAMINED

In order to consider the problem of consumer prices, two measures will be employed as dependent variables. First, Albion and Farris (1980, 1987) and Steiner (1973, 1984, 1991a) have specified the retail brand gross margin as a key variable in examining the effects of manufacturers' consumer-directed advertising on retail competition and consumer prices. Dual-stage applications have utilized retail margins measured in dollars (Liebermann and Ayal 1985) and by percentages (Farris and Albion 1987). This study will employ both measures of this dependent variable.

According to the dual-stage theory, as manufacturers increase their differentiation efforts for their brands (independent of their distribution channels), the margins which retailers receive should decline. Therefore, the present analysis will provide evidence as to 1) whether the retail margins for the advertised brands, measured both in dollars and by percentages, declined after the manufacturers initiated direct-to-consumer advertising and 2) whether retail margins for direct-to-consumer advertised brands declined relative to other brands which were not advertised.

To test the hypotheses, the presence or absence of direct-to-consumer advertising will be measured as a dummy variable over the six-year time period, since the annual advertising expenditures were not available for all brands. This provides a starting point for direct-to-consumer

advertising and was identified through trade publications and popular press. Data comprised of annual observations of retail margins are separated into groups of advertised and unadvertised brands. This enables a comparison of average brand margins before and after advertising was initiated.

SYNOPSIS OF THE RESEARCH METHODOLOGY

In order to examine a relationship between advertising and retail margins in the product categories within this industry, the method to be used in this study is a regression which will compare the average retail margins before and after the initiation of direct-to-consumer advertising. This is tantamount to a quasi-experiment with the initiation of manufacturers' direct-to-consumer advertising as the treatment for one group.

The test group is comprised of a sample of brands which began advertising between and including June 1986 to June 1992. The retail margins for the advertised brands are compared to retail margins for a control group of drug brands which did not advertise directly to consumers.

First, to find evidence of a relationship between manufacturers' advertising and retail margins, the retail margins of brands which began advertising will be analyzed before and after the initiation of the direct-to-consumer advertising. Second, as a baseline for comparison, the retail margins of the advertised brands are compared to margins of a sample of brands in the same product categories, or therapeutic classes,

which have never advertised directly to consumers. A third comparison is made between the margins of advertised brands and the margins of the Top 120 brands. Further description of the data and methodology is presented in Chapter IV.

SIGNIFICANCE OF THE RESEARCH

CONTRIBUTIONS OF THE RESEARCH

This dissertation is intended to contribute to the marketing literature, managerial practice, and public policymaking in a number of ways.

First, the use of prescription drugs for analysis provides some unique research opportunities. Prescription drugs offer a unique product grouping for research because the individual therapeutic classes represent relatively well-defined product markets with few substitutes. For example, the brands included in the product category of hypertensive medications would have fewer uses and fewer substitutes than products such as potato chips or canned vegetables, which may have several substitutes which may or may not fall into the same "category." Further, the prescription drug industry is distinctive in that the manufacturers provide medications for broad consumer use through regulated channels. The ultimate user, the patient, does not have direct access to prescription drugs. Information available directly to consumers is also controlled by regulators, and there are risks associated with the uninformed use of the products. Further description and explanation of the use of this product category is included in Chapter III.

In addition, this study is intended to test the robustness of the dual-stage theory as developed by Steiner (1984), Farris and Albion (1987), and Lynch (1986). Previous research has strongly suggested that the effects of advertising on margins and prices are dependent upon the product categories which are examined (Albion and Farris 1987; Borden 1942; Braithwaite 1928; Farris and Albion 1983; Ivey 1923; Porter 1974; Weiss, Pascoe, and Martin 1983; Urbany, et al. 1993). This is important from a research perspective and has considerable managerial significance as well, since the "general" relationships which have been described for some product categories may not apply to others. The product category to be analyzed in the present study may be considered "different" from those analyzed in previous research because of the extended purchase process, the similarities across channels of distribution, and the complexity of the products. Discussion in Chapter III will provide a description of the prescription pharmaceutical industry so that the dual-stage theory may be applied.

The design of the present study should enable the analysis of factors which have not been considered previously. Although it has been suggested (Mackintosh and Frey 1978; Albion 1983), only a few studies have employed a longitudinal analysis of prices with respect to advertising (Glazer 1981; Liebermann and Ayal 1985; Steiner 1978b), and these did not isolate brands within a product category for before-and-after analysis of either margins or prices within marketing channels. The use of annual observations in this study will allow comparison of retail margins before and after manufacturers' advertising is initiated. Also, by selecting brands which began advertising at different points in

time relative to one another, the design should enable the isolation of those differences in margins which may be attributed solely to the initiation of advertising.

This dissertation will also address questions of managerial relevance. The effects of one marketing mix variable upon others have been recognized as important from theoretical and applied perspectives (Eskin and Baron 1977; Farris and Reibstein 1979; Kanetkar, Weinberg, and Weiss 1992; Lilien and Kotler 1983; Morash and Ozment 1989; Prasad and Ring 1976; Rao 1984). This study will consider pricing and promotion factors within the pharmaceutical industry in order to identify operationally relevant relationships between manufacturers' advertising and consumer prices.

Farris and Albion (1980) have further suggested that the net effects of a manufacturers' advertising should be considered in the establishment of the advertising budget. Discussion in Chapter VI will illustrate why that may not be the case in the prescription pharmaceutical industry.

Further, specific public policy questions may be addressed regarding the nature of prescription drug advertising and its potential effects on consumer prices. The Food and Drug Administration has rededicated its efforts toward the examination of the effects of advertising and other promotional practices in the pharmaceutical industry (Kessler and Pines 1990; Thompson 1991). The prices of drugs have merited Congressional inquiry (Hearing 1992a; Hearing 1992b; Office of Technology Assessment 1993; Pryor 1994; Staff Report 1991). At least one pharmaceutical

industry top executive has expressed concern about the industry's pricing practices (Vagelos 1991a), stating that the industry "must set responsible prices, must keep prices down, and must help improve access to important medicines." The results from this study are intended to help in developing industry and public policy in that area.

RESEARCH LIMITATIONS

Statements based on results from the present research may be qualified on the grounds that the product categories to be examined are "too different" from other types of marketed goods. From the standpoint of research, the fact that prescription drugs have been distributed and promoted differently than other types of products is acceptable, because as previously mentioned, one of the purposes of this research is to define the limits of the dual-stage theory. Further, within the framework to be described below, the application of the dual-stage theory to this particular product class is entirely relevant. Previous empirical work has focused primarily on grocery products, leaving hypotheses applying to other types of consumer goods untested.

The research proposed here may be limited, however, on other bases. First, it does not consider the dispersion of prices within geographic areas, between different types of retailers (e.g., chains versus independents), or between different types of wholesalers. Any results obtained from this study may lead to further research which may control for these channel variables, although some 80% of prescription drugs are distributed through 8 wholesalers nationwide (there are also comparatively few different types of wholesalers used by pharmaceutical

companies [Robbins, Speh, and Mayer 1982]). The present study could not take into account advertising or other marketing activities by retailers or wholesalers, but rather will assume that promotion by channel members affects the margins and prices of all advertised brands in a similar manner. These assumptions are further described in Chapter III.

The research does not incorporate a measure of the intensity or effectiveness of manufacturers' advertising for some brands, since these data were not available for all brands. Because the practice is relatively new, and relatively small-scale within the industry compared to other types of promotions, the data have not been systematically tracked. Therefore, an "event" representing the initiation of advertising will be incorporated in the analysis for all brands, represented in the analysis as a dummy variable.

Given these limitations, this study will attempt to identify and measure certain relationships among marketing variables in this particular industry. The specific threats related to the validity of the results of the study will be identified and considered as conclusions are derived.

ORGANIZATION OF THE DISSERTATION

Chapter II of the dissertation will consider the relevant theoretical bases for the development of the hypotheses. The dual-stage theory can offer information from a "macro" perspective (e.g., Steiner 1978a, 1985, 1991a) as well as from a "micro" perspective (e.g., Albion and Farris

1987; Liebermann and Ayal 1985). The results of this study are intended to provide the basis for recommendations for public policy as well as for managerial practice in the drug industry.

Chapter III will provide a description of the prescription pharmaceutical industry, including a description of the structure and strategic practices of the industry at both the manufacturing and retail levels, the individual therapeutic classes and brands which are to be analyzed, and the behavior of the consumers of the products. This discussion will provide additional information and bases for the hypotheses, and will identify variables which may affect the results and conclusions derived from the study. Chapter IV will first develop the hypotheses to be tested, discuss the sources of data which will be used, and then delineate the means by which the data will be analyzed.

Chapter V presents the results of testing the research hypotheses, while Chapter VI offers theoretical, managerial, and policy implications of the results, including further discussion of the contributions and limitations of the study and suggestions for future research.

CHAPTER II

LITERATURE REVIEW AND DEVELOPMENT OF THEORY

This chapter will describe the "dual-stage" theory and its application. The dual-stage theory has been formally tested in only a few food and non-food product categories, but previous results have provided strong evidence that the retail margins for highly advertised manufacturer brands are substantially lower than those margins for less-advertised or unadvertised brands. The literature discussed in this chapter will provide evidence for the following assumptions: 1) that retail margins for products decrease as a result of manufacturers' brand advertising, 2) that the effects of advertising on retail margins and consumer prices vary depending on the product, the structure of the industry, and the nature of product's distribution, and 3) that there are important theoretical, managerial, and public policy implications as a result of the lower retail margins.

The chapter is outlined as follows: first, a brief discussion of the literature which has analyzed relationships between advertising, prices, and retail margins; second, a presentation of the dual-stage theory and a discussion of the implications of this theory; third, a presentation of calls for research; and finally, the implications of previous research which guide the present study. Chapter III will then provide

the assumptions regarding the drug industry, enabling further specification for the application of the dual-stage theory.

ADVERTISING AND PRICES

Several reviews have been written which have examined the theoretical relationships between advertising and prices at both the manufacturer and retail levels (Comanor and Wilson 1979; Doyle 1968; Farris and Albion 1980; Firestone 1967; Hendon 1975; Jacobson and Nicosia 1981; Norris 1984; Reekie 1981; Schmalensee 1972). A number of approaches have been developed in the analysis of the issue, each with different assumptions regarding the purpose of a firm's advertising, branding, pricing, and the effects of these marketing variables on consumers and on competition. It is then not surprising that conflicting conclusions have been derived. This has provided an inconsistent basis for public policy as well as managerial decision making (Norris 1984; Scherer and Ross 1990; Steiner 1991a, 1991b). The following section will briefly describe some of the assumptions made in previous research.

EARLY DISCUSSIONS

The analysis of the effects of advertising on price has its roots deep in economic theory. While Chamberlin's Theory of Monopolistic Competition (1933) has been considered by many researchers (e.g., Albion 1983) to be a milestone in the analysis of the price effects of advertising, literature published prior to Chamberlin suggests that the concepts and issues involved in analyzing the economic effects of advertising were already fairly well developed.

Some of those early conceptual issues are relevant to the present study, and contribute to later theories, but these issues also provided the potential for discrepancy as their assumptions were applied to later research efforts. Early theorists recognized that different product categories or industries may be different in terms of the effects of advertising on prices (Chamberlin 1933; Copeland 1923; Braithwaite 1928; Ivey 1921). Also among the earlier contributions was the recognition of the difference between those costs which increase the supply and those which increase the demand (Braithwaite 1928; Cherington 1913; Moriarity 1923; Vaughn 1928). This contradicted the classical approach which combined all costs to the businessman as "production costs."

It was also well-accepted that advertising by the manufacturer could influence the consumer's information or education about a product or product category, and that this information could affect the subjective valuation of the product, thereby influencing prices and distributor margins (Braithwaite and Dobbs 1932; Moriarity 1923). Early discussions further acknowledged that advertising could allow a manufacturer to increase or maintain prices above a "natural" level because of subjective value added by reputation (Braithwaite 1928; Moriarity 1923), and attributed the higher prices to some other characteristic than the additive costs of "selling." It was further acknowledged that advertising by manufacturers could influence retail pricing decisions and therefore distributor margins (Borden 1942, 1945; Braithwaite and Dobbs 1932; Chamberlin 1933; Fogg-Meade 1901; Marshall 1919; Moriarity 1923). These early discussions set the stage for formal theory

development, but also show the potential for the variances in assumptions and results derived in later research.

RECENT THEORIES

More recently, two predominant schools of thought, both of which are considered subsets of industrial economics, have emerged as bases of theory. One of these approaches has attempted to describe competitive effects of advertising under the primary assumption, following Robinson (1933, p. 90), that advertising influences industry structure, operating as a barrier to entry, and thereby influencing individual firm performance, especially profitability (Bain 1956; Comanor and Wilson 1967; Schmalensee 1972). Specifically, if a small number of firms accounts for a large proportion of an industry's output, and if the "barriers to entry" are high, there is the assumption that these firms may tacitly collude on price, effectively avoiding price competition (Arterburn and Woodbury 1981; Bain 1956; Comanor and Wilson 1967; Porter 1974; Scherer and Ross 1990; Wills and Mueller 1989). Therefore, advertising intensity (e.g., expenditures on advertising relative to sales) may influence profitability of a firm and an industry through raising the costs of entry into existing markets. Discussion has been presented as to whether the increased profits are a result of increased efficiency of firms (which may be a result of size or cost advantages) or supra-competitive pricing practices (Wills and Mueller 1989), although it is generally recognized that "structuralists" find that increased advertising in an industry tends to raise price levels (Farris and Albion 1980; Scherer and Ross 1990).

Another stream of literature within industrial economics has been that of the "economics of information." The basic assumption employed is that advertising acts as information in the market. Because advertising informs consumers of more brands (and/or the prices of those brands) in a product category, consumers may make decisions using increased product knowledge. Because consumers are aware of more characteristics about more brands, brand switching is more prevalent, and firms are forced to compete on the basis of price. The market level effect of advertising according to this theory is to create lower prices. The role of advertising under this theory suggests a closer approximation of "perfect competition," under which consumers are assumed to have perfect knowledge of products in the market. This concept has been the theoretical basis for a number of empirical analyses in the economics literature (Darby and Karni 1973; Feldman and Begun 1980; Glazer 1981; Luksetich and Lofgreen 1976; Marvel 1976; Marvel 1979; Maurizi 1972; Maurizi and Kelly 1978; Nelson 1970, 1974, 1975, 1978; Pauly and Satterwaite 1981; Rosen 1978; Satterwaite 1979; Telser 1971), as well as in the marketing literature (Bloom and Krips 1982; Farley 1964; Ford, Smith, and Lynch and Schuler 1990, 1991; Smith 1990; Swazy 1988; Tellis and Fornell 1988; Urbany et al. 1993; Wilcox 1982).

It has been noted in earlier discussions (Albion 1983; Norris 1984; Reekie 1981; Tellis and Fornell 1988) that analyses employing either the "barriers to entry" assumptions or the "information economics" assumptions tend to arrive at very different, and often conflicting, results and implications. Part of the discrepancy may be attributed to differing assumptions as to the role of advertising in a firm's (or

industry's) activities, since advertising may be considered part of an industry's structure, part of a firm's conduct, or a result of a firm's or industry's performance (Sawyer 1981). It has also been suggested that disparities in results may have also arisen because of differing units of analysis (Tellis and Fornell 1988), because of misspecification of theory (Reekie 1981), or because of data aggregation problems (Norris 1984; Porter 1974).

A further limitation of traditional industrial economics approaches is that empirical analyses are limited in their generalizability because they have tended to examine either retail advertising's effects on retail prices (Benham 1976; Cady 1976; Glazer 1981; Luksetich and Lofgreen 1976) or manufacturers' advertising on manufacturer prices or profits (Nelson 1978; Porter 1974; Ogilvy Center 1987; Wills and Mueller 1989), thereby excluding the potential effects of one channel member's differentiation efforts on the strategies of other members of the channel. Market/industry definition has also been problematic (Nelson 1970; Porter 1974), since as discussed above, the effects of advertising, however defined, may vary across product categories. The application of industrial economics theories have therefore brought about widely varying interpretations of the effects of advertising on consumer prices and competition (Norris 1984).

Divergences from these traditional industrial economics theories have asserted and provided evidence that, in a number of product categories, <u>manufacturers'</u> advertising may have margin and price effects at the <u>retailers'</u> level (Bresnahan and Reiss 1985; Economists Advisory Group

1967; Greer 1992; Kanetkar, Weinberg and Weiss 1992; Nelson 1978; Porter 1974; Reekie 1981; Weiss, Pascoe, and Martin 1983;). Theoretical explanations for these observations have included variations in consumer information for certain product categories (Nelson 1978), variations in channel power (Porter 1974), and variations in the performance of functions within distribution channels (Reekie 1981). These departures from traditional industrial organization theory are particularly important because they recognize the importance of distributors' efforts in the process of distribution, and also point out that manufacturers' advertising may not affect all product retail margins in the same manner because of differences in channel structures or in market structures.

Previous researchers have therefore suggested (Albion 1983; Albion and Farris 1987; Lynch 1986; Steiner 1991a) that the effects of manufacturers' brand advertising might be better observed by employing retail margins, rather than prices, as a measure of relative consumer costs. The next section will describe the literature which has proposed that retail margins at the brand level should decrease with relatively higher levels of manufacturers' brand advertising. The theory to be applied in this study incorporates a "vertical perspective" of the advertising/price relationship, which will provide insight into some of the effects of brand advertising by manufacturers. The theory to be described in the following section, in conjunction with a description of the prescription drug industry presented in Chapter III, will provide the basis for the hypotheses.

ADVERTISING AND RETAIL MARGINS: THE DUAL-STAGE THEORY

The "dual-stage" theory of the price and advertising relationship has also emerged as an application of the theory of monopolistic competition. As discussed earlier in this chapter, marketing and economics theorists have long acknowledged the possible effects of manufacturers' brand advertising on pricing decisions made by members of the distribution channel, especially the retailer (Fogg-Meade 1901; Powers 1900). A more formal description of this process was suggested by Hawkins (Hawkins 1939; Hawkins 1940; Hawkins 1950; Hawkins 1954), who delineated manufacturer-retailer relationships in order to address public policy issues surrounding retail price maintenance and fair trade laws, and in doing so provided the basis for later theory development and analysis.

Steiner (1973) reintroduced this vertical description of the marketing system, and specifically addressed how advertising may affect retail prices and margins. Steiner's hypothesis was that large-scale brand advertising by manufacturers resulted in reduced retail margins. In other words, the question of the net effects of manufacturers' advertising may be addressed by analysis of the pricing decisions at two stages of distribution -- at the manufacturers' level and at the distributors' (retailers') level.

Observing evidence from the toy industry (Steiner 1973), Steiner noted that heavy brand advertising increased turnover at the retail level.

Because of this, retailers were able (and compelled by competition) to reduce prices of the advertised products. Steiner argued that heavy advertising increased price comparison through improved product identification and that the increased competition from the advertised brands prompted price reductions in unadvertised brands. As a result of this, manufacturer-to-retailer prices were relatively higher in advertised brands, while retailer-to-consumer prices were relatively lower. From this, Steiner hypothesized that manufacturers' prices (and profits) would increase, while retail prices would actually decrease. In effect, there were two distinct "stages" in the process of distribution which were affected by the manufacturer's advertising -- a manufacturer-retailer stage and a retailer-consumer stage -- each of which had its own demand curve and associated elasticity. When manufacturer's brand advertising made it more important for a retailer to carry a brand, the retailer's elasticity decreased, allowing the manufacturer more "power" in the relationship, and requiring the retailer to accept lower margins to carry the product.

Steiner's further development of this concept led to a set of "advertising life cycle" propositions (Steiner 1977, 1978c, 1984), which described the margin-depressing effects of advertising in a consumer goods industry over time. The first phase of this life cycle is the "unadvertised goods industry," in which the typical item is "blind" in that consumers are uninformed about it. The consumer would become acquainted with the existence and attributes of the product only through inspection at the point of purchase. At this stage, the manufacturer's price to retailers would greatly affect the retail acceptance of the

brand since retailers would carry the least expensive version since consumers would have little or no preference. In other words, the demand curve is more elastic at the manufacturer's level than at the consumer level.

In the second phase, a single manufacturer would begin to advertise a brand so that retailers may find that the public expects them to carry the brand. The manufacturer is able to increase the retail distribution of the brand with incrementally fewer price concessions.

In the third phase of the life cycle, the strength of this paradigm in a real-world application emerges. As competing brands begin to advertise, the manufacturers' advertising increases the competition among retail resellers of the brands, in effect causing the demand curve for an individual retailer to become more elastic. Consumers choose among all retailers which carry the advertised brands, and select the store which sells the brand at the lowest price. In essence, the store's elasticity is inversely related to the gross margin of the retailer. Further, each manufacturer has considerable incentive to advertise, in order to induce retail coverage and to decrease retail price elasticity. There are, in effect, two relationships which are described in the dual-stage theory as a result of the manufacturers' advertising: the first is that between the initial retail coverage and the ultimate realized retail coverage ("market penetration") and the second is that between the manufacturer's price and the consumer's price ("gross distribution margin").

The fourth phase, the maturity phase, occurs when the industry no longer expands. Under these circumstances, it is possible that a "few pre-eminent advertisers" are able to establish brand loyalty among consumers to the extent that new brand entry is very difficult. Steiner (1977) referred to this as the "manufacturers' brand domination," and asserted that in this case, the assumptions of the neoclassical model (e.g., Comanor and Wilson 1974; Tellis and Fornell 1988) are more likely to apply. It is very difficult either to increase retail penetration of any brand or to reduce retail margins further. Advertising would no longer act to increase the elasticity of retailers or consumers but rather would serve "manufacturers only by diminishing the elasticity of their demand curves so as to permit a material advance in factory prices with a relatively small fall-off in unit sales, per the conventional economic model" (Steiner 1977, p. 37).

Another possible outcome of the maturity phase would be the emergence of alternative brands at the retail level (store brands). Steiner (1978c) observed that in many consumer goods categories, the store brands forced out weaker manufacturers' brands, since stronger retailers have control over shelf space. Steiner submitted that store brands are intended to capture higher gross margins for the retailer, but must be retailed at lower prices than national brands if they hoped to compete (owing to their inferior reputation). Under this scenario, manufacturer brand prices may act as a price ceiling for store brands (Albion 1983), but it is in the manufacturer's interest to advertise intensively if those advertised brands are to be differentiated. Steiner (1978a) attributed the enormous growth of national advertising to this phenomenon.

The net effect of manufacturers' brand advertising is then to relatively decrease consumer prices. That is, retailers make pricing decisions in such a way that equal margins are not applied to the advertised and unadvertised brands, so that the absolute price to the consumer for the advertised brand is lower than it would otherwise be without the manufacturers' advertising efforts. From this theory and its application, conclusions have been drawn at both the "micro" and "macro" levels of analysis.

The dual-stage theory can provide information which may help decision-making from a "macro" perspective, in that it can describe manufacturer-retailer relationships at the industry level. Steiner (1978a) initially proposed analysis of "marketing efficiency" employing the dual-stage perspective and has more recently developed public policy using this perspective (Lynch 1986; Masson and Steiner 1986; Steiner 1985, 1991a, 1991b). Albion and Farris (1980, 1987) have suggested the usefulness of employing this perspective in the analysis of brand-level decision making (e.g., advertising budgeting decisions).

APPLICATIONS OF THE DUAL-STAGE THEORY

While a number of studies have provided evidence of an inverse relationship between manufacturers' advertising and retail gross margins (Borden 1942; Bresnahan and Reiss 1985; Nelson 1978), there are relatively few direct tests of the dual-stage theory. Steiner applied the conceptual model toward the description of factory and retail prices in various industries, including toys (1973), women's apparel (1978a), and bicycles (1978b). The most recent extension and mathematical

formalization of the theory has been in the area of public policy (Albion and Farris 1987; Lynch 1986; Masson and Steiner 1985; Steiner 1991a, 1991b).

The fundamental premise of the dual-stage approach -- that retail margins are smaller for heavily advertised brands -- was tested by Albion and Farris (Albion and Farris 1981; Albion 1983; Albion and Farris 1987) across a broader group of grocery products. Data consisted of advertising expenditures and retail margins for 488 individual brands in 51 categories of food and food-related products sold in supermarkets for a single year. The results strongly supported Steiner's contention that advertised brands were sold at lower retail margins than unadvertised brands. Their results also suggested a relationship between high levels of advertising and low retail margins which was independent of scale economies created by advertising or retail turnover.

The strength of this relationship varied across product categories. Albion's (1983) explanation was that this variance was dependent on the "salience" of a brand -- how important consumers view the brand and how a price decrease would affect the individual retailer. In general, the more a consumer is willing to spend on a brand, the more salient the brand. However, retailers of grocery items use popular brands to generate store traffic, and therefore often discount the prices of the more salient brands. Albion argued that because each retailer sells a wide variety of products, each retailer will have his/her own opinion of which brands of which products build traffic, so that "loss leaders"

vary among stores. Albion posited that the manufacturer's advertising would increase the salience of a brand, but more importantly, that the salience of a brand may affect the demand for other products in the same multiproduct retail store. Ultimately, Albion argued that "what has been omitted in the [previous] economic models of derived demand is the consumers' demand curve for a particular retail outlet" (p. 265).

There have been few empirical tests of the dual-stage theory as it would relate to changes in margins or prices in multiple time periods. Liebermann and Ayal (1985) performed a longitudinal analysis which tested the Steiner model. Using semiannual observations over a period of six years, they were able to derive statistically significant coefficients which suggested 1) a negative correlation between a brand manufacturer's advertising and retail margins and 2) a positive correlation between the manufacturer's advertising and manufacturer margins. Liebermann and Ayal did not attempt to generalize their results whatsoever, and provided no baseline for comparison, but their results provided evidence that these relationships existed in three brands of a "certain non-durable convenience item" for a single manufacturer over the six-year time period.

Previous studies which have applied the dual-stage theory have derived "macro"-level implications (Albion 1983; Steiner 1973, 1978a, 1978c, 1985, 1991a). Albion (1983) arrived at the conclusion that "the cost of bringing a product to consumers is lowered by advertising... this reduction in cost, manifest in the reduced retail gross margin, is measurable" (p. 8). In essence, the reduction in retail margins is

translated into a net reduction of overall consumer prices. Further, Steiner (1991a) has also derived conclusions which suggest potential anticompetitive effects of manufacturers' advertising, since the brand advertising tends to increase a manufacturer's power in the channel, reducing the competition among brands within stores.

Previous applications of the dual-stage theory have also provided implications at the "micro" or managerial level. Because the relative increase in retail price of the advertised brand (theoretically) leads to decreased demand for that brand, Farris (1981) concluded that a reduction in the manufacturer's advertising budget would actually have longer-term effects on retail margins (and therefore prices). If the manufacturer decreases its advertising, retail competition would be reduced, and the retail price would ultimately increase. It would follow then that, in addition to the reduction of demand in response to decreased advertising, demand would decline even further as retail price increased (even if the manufacturer's price remained the same). Albion and Farris (1987) have further concluded that

> [i]f changes in advertising budgets do not consider [the effects of retail margins on consumer demand]... the total contribution of advertising to sales and profits may be underestimated... [and that] estimates of the impact of advertising on retail price that recognize retailers as only passive participants in the market may overestimate the effects of advertising on retail price (p. 131, italics in the original).

Therefore, comprehensive models of demand should incorporate some measure of these effects of advertising both on demand and on retail prices. Unfortunately, the published literature along those lines is not well developed.

In summary, empirical application of the dual-stage theory has been limited primarily to grocery products in cross-sectional single time periods. The theory appears to be comprehensive in that it incorporates consideration of more of the "marketing mix" in its specifications and explanations, and it seems to have great potential for application toward realistic marketing situations. The present study will employ this theory in order to examine the relationship between manufacturers' direct-to-consumer advertising and retail margins before and after the initiation of the advertising, providing a baseline for comparing retail pharmacy margins and price changes.

CALLS FOR RESEARCH

The calls for research which direct the present effort express the need 1) to examine general relationships of marketing mix variables, 2) to provide further empirical evidence in support of the dual-stage theory, and 3) to address the specific consequences of manufacturers' advertising in the pharmaceutical industry from a public policy perspective.

In general, marketing researchers have recognized the need for further research in addressing the effects of marketing mix variables upon one another. For example, Morash and Ozment (1989) noted that the analysis of the "interaction" of marketing variables is important from a managerial point of view. Lilien and Kotler (1983) have observed that

> [M]any practitioners believe that advertising reduces price elasticity and also that advertising is more effective at higher prices. However, empirical evidence does not support this view. It seems that the specific structure of the market studied, as well as the nature of the advertising (medium, message), may affect the sign and the magnitude of the interaction (p. 662).

Lilien and Kotler also suggested that marketing-mix models should 1) allow for marketing mix interactions in general, 2) permit advertising to increase or decrease price sensitivity, 3) permit price to increase or decrease advertising effectiveness, 4) incorporate competitive effects. It would seem that empirical analysis may offer considerable managerial insight and perhaps contribute to the development of models which could treat each mix variable endogenously.

More relevant to the present topic, Rao (1984) stated that

> [W]hile the issue of how price and other elements of the marketing mix interact is critical in making practical marketing decisions, the topic has been severely underresearched....The question of how advertising and price interact is very interesting because of its managerial and social implications.....These empirical findings have implications such as potential necessity to alter retail or wholesale prices when advertising budgets are changed and potential underestimation of the long-term contribution of advertising to sales and profits (p. S57).

Previous researchers have also called for specific testing of the dual-stage theory to determine its generalizability. For example, Albion (1983) has stated that

> ...the Steiner view provides a much richer theoretical base than previous theories for analyzing the effects of advertising on prices...the logic used to explain the difference among product categories...can be used to explain the variation in the manufacturer-retailer interaction between advertised and unadvertised brands in the same

> product category at any one time...Much work remains to implement this model...more tests of the model are also needed" (p. 55).

But Albion and Farris (1987) have also noted that

> [i]n spite of the fact that several studies support the basic idea that advertising for individual brands can lead to lower retail gross profit margins, this finding has yet to be incorporated in other, potentially related work, in advertising management. Some of this reluctance is probably due to the lack of cross-validating findings from several different industries (p. 115).

An application of the dual-stage theory in a non-grocery product category such as prescription pharmaceuticals would seem merited.

Albion (1983) also stressed the need for further tests of the validity of the dual-stage model by employing longitudinal data, by observing different scenarios of new entry (e.g., when manufacturer's brand enters a private label market or when generics enter a brand-dominated market, p. 266), and by observation across a variety of product categories. The present study represents an application of the model under conditions where the manufacturer attempts consumer-directed differentiation with a previously unadvertised brand among a group of competing unadvertised brands.

As previously mentioned, the present study is also intended to provide some specific evidence relevant to an important public policy issue. Various constituencies have argued that direct-to-consumer advertising would result in higher consumer prices (Hoff 1984; O'Brien 1986; Rogers 1986; Cohen 1988; Hearing 1991), under the assumption that advertising costs would simply be added to the ultimate price of the advertised product. Under the same general assumption, others have maintained that

the increases in prices observed over the past fifteen years may be attributed to the increased promotional efforts of drug makers (e.g., Potter 1988). Other analysts have generalized from examples in other product categories, and have argued that direct-to-consumer advertising would increase competition (either among manufacturers or at the retail level), thereby reducing consumer prices (Alperstein and Peyrot 1993; Masson and Rubin 1986; Mossinghoff 1988). Speculation on either side of this debate has been made without direct empirical evidence (for example, Alperstein and Peyrot 1993; Sheffet and Kopp 1990; Schrader 1993). Employing the dual-stage theory, this study will address specific issues related to the pharmaceutical industry, and is intended to provide evidence of some of the effects of direct-to-consumer advertising at the consumer level. Further discussion in Chapter VI will elaborate on not only the price effects of manufacturers' advertising in the drug industry, but will also specify some of the further public policy issues which may be involved as a result of the practice.

IMPLICATIONS FOR PRESENT RESEARCH

Given the previous discussion, the present study is intended to address theoretical, managerial, and public policy issues related to direct-to-consumer advertising and the consumer prices of prescription pharmaceuticals. The dual-stage theory provides ample basis for the testing of hypotheses within industry- and purchase-specific contexts, there have been few empirical tests of the theory in non-grocery product categories or over multiple time periods.

The most recent popular theories of industrial organization (e.g., Comanor and Wilson 1967; Nelson 1970; Porter 1974) have focused nearly entirely on those factors influencing the manufacturer's profitability, and have attempted to derive some association between high relative levels of advertising with high levels of (manufacturers') profits while at the same time ignoring the role of distribution in product differentiation as well as ignoring the role of advertising at the consumer level. However, given the previous discussion, a relatively rich body of theory may provide the basis for some hypotheses to be tested.

It would appear from the preceding discussion that a manufacturers's brand advertising may have differential effects <u>within</u> distribution channels, and may create more retail competition and thus lower retail margins and relatively lower retail prices. While this concept was recognized as national brand advertising became more common (Fogg-Meade 1901; Powers 1900), theories have since been formalized by Hawkins, Steiner, Farris, and Albion.

The dual-stage perspective lends itself to the analysis of convenience products, where there exists a relatively large amount of retail competition. The dual-stage model has yet to be applied across many other product categories, including prescription drugs. The vertical approach is comprehensive in that it may be applied toward longitudinal analysis and may incorporate prices at different levels in the distribution channel at different points in time.

The unit of analysis in the vertical perspective suggests that manufacturers' profits and market share (typically measures of "market power") are not the only dependent variables to be considered. Porter (1974) contended that a product may become differentiated through the efforts of all members of the channel: the greater the role of the retailer in brand differentiation, the less profitable the product becomes for the manufacturer. However, when the manufacturer exerts the dominant differentiating efforts, the manufacturer tends to hold more of the power in the channel and is able to capture more of the brand's profitability. By examining the retailers' role(s) in product differentiation, some insight into how the manufacturer may affect manufacturers' prices and profits may be uncovered. Discussion in Chapter III will describe the nature of channel relationships in the pharmaceutical industry and will present evidence which will suggest how direct-to-consumer advertising by drug manufacturers may affect retail margins.

The analysis in Chapter IV will provide a test of the dual-stage proposition that manufacturers' advertising will affect retail margins for the advertised brands of prescription drugs. The topic of retail pricing policies and margins for pharmacies has been addressed in the pharmacoeconomic literature (Schondelmeyer 1992; Thomas and Scholdelmeyer 1992), as well as pharmacy trade publications (e.g., Brookman 1981; Seltzer 1986; "HCFA Study..." 1990). Albion (1983) operationalized retail competition as the "brand gross margin," the difference between the manufacturers' price and the retail selling price for a brand. If the manufacturer maintains product differentiation by

its own means -- e.g., through brand advertising -- then the retailer's gross margin should decrease. If, on the other hand, the retailer provides some type of differentiating attributes to the product -- through substitution of competing brands or through some form of added value -- then the retailer may achieve higher margins associated with non-advertised products.

In order to ground the hypotheses in realistic assumptions, the next chapter will describe the pharmaceutical industry and product categories within this industry in order to derive a set of assumptions and to develop a theory of what may occur in the specific case of prescription drugs.

CHAPTER III

THE PRESCRIPTION DRUG INDUSTRY: A DUAL-STAGE PERSPECTIVE

The focus of the present study is confined to the potential effects of direct-to-consumer advertising of prescription drugs on the retail gross margins of drugs and how those margins would affect the prices which consumers would pay. According to Albion and Farris (1987), "...the study of retail gross margins is, in effect, the study of retailer and manufacturer pricing decision" (p. 109). Employing this premise, this chapter will contribute to the development of the hypotheses by describing aspects of prescription pharmaceutical manufacturing and retailing which affect the pricing policies of drug makers and sellers, and would therefore affect retail margins. The purpose of this chapter is to specify characteristics of the industry, the products, their distribution, and consumers in order to apply the dual-stage theory described in Chapter II.

A presentation of earlier research which has examined the pharmaceutical industry will provide support for the assumptions that 1) the direct-to-consumer advertising of prescription drugs decreases consumers' interbrand price sensitivity for drugs but increases consumers' intrabrand (retail level) price sensitivity for drugs 2) physicians are not directly sensitive to drug prices but direct-to-consumer advertising

of drugs may influence prescribing behavior indirectly through consumers 3) competitive factors influence pricing decisions at the manufacturing and retailing levels of distribution and 4) the effects of direct-to-consumer drug advertising on retail margins and on consumer prices can be detected using the appropriate comparisons among brands and across therapeutic classes.

The chapter will begin with a depiction of the changes in the environment in which drug makers and sellers operate. This is important to consider because the industry has evolved from a basic commodity manufacturing industry into a research- and promotion-driven industry, which has led to changing roles in the manufacture, distribution, and promotion of prescription drugs. This description will be followed by a discussion of strategies which manufacturers have adopted in response to changes in the environment. Some firms have reacted to environmental pressures by adopting new marketing strategies, including direct-to-consumer advertising.

Finally, this chapter will discuss how the marketing strategies by manufacturers and retailers are interrelated. Employing a framework derived from Nagle (1987), this chapter will delineate the specific elements of the industry which determine whether direct-to-consumer advertising is related to retail margins and therefore to consumer prices.

THE ENVIRONMENT AND MARKETING STRATEGIES OF THE PHARMACEUTICAL INDUSTRY

EARLY INDUSTRY DEVELOPMENT

Prior to the development of sulfa drugs in the 1930s, the pharmaceutical industry was comprised of companies which manufactured standardized chemical commodities. Comanor (1964) characterized the ethical drug industry as having low entry barriers and a "high degree of competition" (p. 373) during this time. Any nonnarcotic medicine could be purchased without a prescription before 1938, so drug companies did not extensively advertise their products to physicians (Sherman 1900; Temin 1979b). The medicines sold to consumers were compounded by the pharmacist at the retail level.

Even though pharmacies therefore held considerable power in the distribution channel, manufacturers attempted to differentiate their products, so that the "recent" phenomenon of brand advertising directed toward consumers by pharmaceutical manufacturers is not new. Sherman (1900) reported in detail that the "largest advertisers in the world are patent and proprietary medicine makers" (p. 16). Sherman estimated that worldwide advertising expenditures for the two largest firms to be over $2 million in 1899. Sherman also noted that the largest percentage of advertising was directed toward the public, with a representative firm spending only about 10 percent of the total promotional budget ("about $50,000") directed toward physicians in medical journals and "semi-scientific publications." This reflects the nature of the industry at the time, when the physician played only a minor role in the consumer's

medication decision. Changes in the nature of the industry, and changes in the regulatory environment, however, resulted in shifts in the vertical and horizontal structures of the industry (Comanor 1964; Temin 1979a; DeSalvo 1983), which led to changes in power within distribution channels. These changes resulted in extensive alterations of marketing strategies for manufacturers as well as retailers.

First, the Food, Drug, and Cosmetic Act of 1938 required that manufacturers provide warning information on labels for over-the-counter medicines but not for prescription drugs (Temin 1979a). Therefore, a large number of drug makers began selling their products only by prescription to avoid potential mislabeling. This increased the physician's power in drug distribution and demand, so that prescription drug companies redirected their promotional efforts exclusively toward physicians.

Second, as companies began to discover new drugs during and following the World War II, the retailer (pharmacist) was now much less influential in the purchase process, since more complex chemical entities were now available only from manufacturers. A number of "counterfeit" drugs -- basically unlicensed substitutes -- appeared during this time period, and were sold to pharmacists at much lower prices. Pharmacists would offer these counterfeits at much higher margins (it has been estimated that as much as 25% of retail pharmacists practiced substitution of unlicensed drugs during the 1950s [Federal Trade Commission 1979]). This led manufacturers to appeal for antisubstitution laws in each of the fifty states, adding further

constraints to pharmacists' abilities to influence brand choice at the retail level.

Further, as a large number of new chemical entities continued to be developed, the leading drug companies found that profits were only achievable through the maintenance of patent-protected product differentiation. The sustained introduction of new products was a means by which manufacturers could erect barriers to entry; these barriers were enhanced by the fact that drugs were now compounded at the manufacturing level rather than at the retail level. Manufacturers attempted to maintain this position by investing heavily in "intangible capital" -- promotion and research and development -- and by retaining their patent rights rather than licensing production (Temin 1979b). Earlier research (Comanor 1964) assumed that the patent protection, promotional expenditures, and research-driven structure of the industry represented barriers to entry which led to monopolies in the industry. Comanor (1964) described the post-war industry as one in which "[r]ivalry (was) restricted largely to areas other than price. A high degree of price stability on existing products (was) maintained, and new products (were) priced, for the most part, to compete with older ones in the same therapeutic class" (p. 375). The exclusive markets which manufacturers held were further protected by laws which prohibited substitution by retail pharmacists.

The market power granted each firm was actually limited, however. Many of the newly developed drugs, while patented, were chemically unidentified. Chemical entities were developed through a number of

processes, and the outcome of any two processes might produce a similar chemical, each of which might be granted its own patent. A drug in a given market, then, could be offered as two different products by each company holding a patent. The simultaneous discovery of a number of similar drugs would then limit each producer's monopoly power. The producers would attempt to regain market power by differentiating their products primarily through increased advertising and increased personal selling (Temin 1979b) directed toward physicians. More recent analysis of this time period by Temin (1979b) has suggested that competitive forces and marketing activities were responsible for prices within each product category.

Nonetheless, accusations of monopolistic behavior were the basis for intensive scrutiny by various governmental agencies which attempted to show that pharmaceutical firms were capturing inordinate profits from their activities. Political and academic debates have continued as to whether or not the individual firms actually exercised monopoly power over prices during the post-war period (Steele 1962; Steele 1964; Comanor 1964; Temin 1979b; Comanor 1986; Staff Report 1991).

At the regulatory level, the question of anti-competitive practices by drug companies led to extensive Senate hearings (Report 1961), which in turn led to legislation ostensibly created to protect consumers by requiring that all new drugs be tested for safety and efficacy before they were released to the market. Several appraisals of the Cellar-Kefauver Amendments of 1962 have suggested that the legislation might have dampened the development of new drugs and reduced competition in

the industry (Steele 1964; Jadlow 1972; Statman and Tyebjee 1981; Grabowski and Vernon 1986; Jensen 1987) by making it more difficult to introduce "imitator" brands which would theoretically create competition leading to lower prices.

RECENT DEVELOPMENTS IN THE INDUSTRY

Since the Cellar-Kefauver Amendments, there have been further changes in the environment which have influenced the behaviors of drug manufacturers and retailers. First, under pressure to curtail rising medical expenses, all but two states had repealed antisubstitution laws by 1981. This allowed pharmacists to dispense lower-priced generic drugs in the place of prescribed brands if the physician did not specify a brand. Masson and Steiner (1985) provided evidence that these laws increased the drug consumers' price sensitivity and increased the amount of generic usage, but at the same time they found that generic substitution accounted for only 23.3 percent of prescriptions, indicating what they considered to be a strong degree of loyalty to branded drugs.

Second, several foreign drug manufacturers entered the U.S. market, introducing considerable price competition in some therapeutic categories, including generics (Naude 1991; "Japan's fine chemicals..." 1990). For example, relaxation of regulations in Japan have encouraged what were formerly non-drug manufacturers to enter into domestic Japanese drug markets. This in turn has led Japanese drug companies to seek markets in other countries (Yoshikawa 1989).

Third, regulatory changes in the United States were influential in allowing (and in some states, compelling) retail pharmacies to advertise prices. Until the mid-1970s, a number of state- and national-level organizations prohibited advertising by pharmacists on the grounds that the practice was "unprofessional." A number of court cases (Mackintosh and Frey 1978) led ultimately to Virginia Board of Pharmacy v. Virginia Consumer Council (1976), in which the U.S. Supreme Court asserted that a Virginia statute that prohibited drug price advertising violated the First Amendment of the Constitution.

It was also during the 1970s that the Maximum Allowable Cost (MAC) regulations went into effect at the state and federal levels. Again, governments were attempting to contain health care costs, this time by placing a ceiling on the amount of money which state or federal government would reimburse for multisource drugs (those which have generic equivalents) at the retail level. This ceiling is presently determined by the lowest of either 1) the maximum allowable cost price of the drug, if any, 2) the acquisition cost of the drug plus a reasonable dispensing fee, or 3) the pharmacist's usual and customary charge to the general public for the drug.

The Maximum Allowable Cost regulations induced several drug makers to offer their products at lower prices, but also had the effect of lowering retail margins, since the lower prices did not have the effect of increasing the overall demand for the products. Not all drugs are subject to Maximum Allowable Cost regulations, and regulations vary among states (e.g., some states require that all cost savings be passed

on to consumers). Carroll, Siridhara, and Fincham (1987) found evidence that the Maximum Allowable Cost status of a given drug had a definite effect on whether retail pharmacists would substitute. Later surveys have supported this (Simpson and Neff 1990; Smith et al. 1991), although the Smith study found that patient requests were the most common factor in the pharmacist's substitution decision.

Another regulatory landmark was the Drug Price Competition and Patent Term Restoration Act, passed in September 1984 (henceforth referred to as the 1984 Drug Act). The purposes of this act were twofold. First, drug companies had complained since 1962 that extensive safety and efficacy testing which was required under the Cellar-Kefauver amendments reduced the actual lifespan of a patent, since a patent must be granted before a company entered the new drug application process which could take several years. Indeed, Grabowski and Vernon (1986) estimated that the average patent life for a new pharmaceutical was approximately half of the statutory life of 17 years as a result of the Cellar-Kefauver Amendments. The 1984 Drug Act extended the patent life of a drug equal to the sum of the new drug application review time plus one-half the clinical testing time. Each drug was provided a minimum of 5 years of extended patent protection.

The second purpose of the 1984 Drug Act was to facilitate the entry of generic drugs upon patent expiration of a pioneer drug. A generic drug had only to show bioequivalency to the pioneer drug, rather than submit a new drug application and duplication of many of the pioneer drug's tests in order to acquire FDA market approval. Grabowski and Vernon

(1986) asserted that the 1984 Drug Act would result in "substantial" reductions in consumer drug prices in the short run, but that it would be difficult to speculate on longer-term effects of the law. Other researchers have provided evidence that the 1984 Drug Act did indeed enable generic entry into the drug market (Frank and Salkever 1991). The generic market has grown from under $1 billion prior to enactment to approximately $5 billion in 1986 to an estimated $11 billion in 1991 (Peck 1988).

One further piece of legislation, the Prudent Pharmaceutical Purchasing Act, also known as the Pryor Act, was implemented in January of 1991. This law required that pharmaceutical firms charge the federal government the lowest market price for all drugs for Medicaid patients. Again, this law was intended to control the prices that state Medicaid programs paid for prescription drugs. In effect, this law was intended to make drug pricing a more important component of the manufacturers' marketing mix, in addition to innovation and promotion. The full effects of the Pryor Act are yet to be examined, although immediate observations have suggested a mix of pricing responses by drug companies (Barlow 1991, 1992; Myers 1991).

An additional factor in the environment in which drug firms and pharmacies operate has been in the behavior of drug consumers themselves. Consumers have become much more involved in their own health care issues within the past two decades (Blundell 1987; CBS Consumer Model 1984; Gannon 1993; Gould 1988; Sheffet and Kopp 1990; Tootelian and Gaedeke 1986; Vener and Krupka 1986). Not only are

patients more proactive in seeking medical care, but they have become more participative in self-treatments and in influencing physicians' treatment decisions. For example, consumers may now self-administer tests for diabetes, pregnancy, and colo-rectal cancer at considerably lower costs than physicians' visits and laboratory testing. Further evidence of this behavior is suggested by "doctor shopping," through which patients seek out physicians who are willing or able to accommodate their desires for specific treatments (Kasteler et al. 1976). Recent studies have provided strong evidence that prescribing decisions by physicians and substitution decisions by pharmacists are influenced by patient requests for specific drugs (McGinley 1994; Poulsen 1992; Schwartz, Soumerai, and Avorn 1989; Smeeding 1990; Smith, Monk, and Banahan 1991).

STRATEGIC RESPONSES TO ENVIRONMENTAL CHANGES: THE RE-EMERGENCE OF DIRECT-TO-CONSUMER BRAND ADVERTISING

The changing environment described above has led the prescription drug manufacturers and retailers to make a number of strategic and tactical marketing decisions which represent major structural changes in the industry.

First, drug makers have redirected their messages and have changed the content or form of those messages. Previous research has provided evidence of increased advertising expenditures directed toward pharmacists (Statman and Tyebjee 1984; Fisherow 1987), as manufacturers attempted to curtail substitution at the retail level. Content analyses have also found significant changes in the message content of ads

directed toward both pharmacists (Statman and Tyebjee 1984; Fisherow 1987) and physicians (Buc 1982). These have included increased use of comparative claims in advertising, increased use of comparative claims in supposedly objective informative materials such as product labeling and the Physician's Desk Reference, and a decrease in objective information. More recent studies have also observed more aggressive, non-traditional forms of promotions directed toward physicians (Reilly 1993; Wilkes, Doblin, and Shapiro 1992; Rubin 1992; "Pushing Drugs..." 1992; Deutsch 1989; "The big lie..." 1987; Mehta, Sorofman, and Rowland 1989; Neill 1989). These changes in promotion have been interpreted as attempts to secure brand loyalty at the points of brand choice and at points of dispensing.

Second, firms have attempted to intensify the availability of their products by gaining over-the-counter (OTC) status for many drugs (Cusick and Downs 1986; Wilson 1988; Waldholz 1989; Siegelman 1990; Kopp and Sheffet 1991; Rudnitsky 1991b; Tanouye 1993a) and by turning to mail order as a means of distributing drugs (Freudenheim 1988; Horgan, et al. 1990; "Mail order drug sales..." 1988; Munro 1991). Siegelman (1990) reported that 65% of the prescription products which have switched to OTC status have ranked first or second in their categories within the first five years following the switch. Fourteen of the 15 best-selling over-the-counter drugs introduced since 1975 were either switches or switch-related ("Over-the-Counter Sales..." 1994). In addition, the sales of switchover drugs have often doubled or tripled their sales as nonprescription products.

Third, firms have begun to share or exchange the skyrocketing costs of development, manufacturing, and marketing of both prescription and over-the-counter drugs through mergers, takeovers and joint ventures for both prescription and over-the-counter drugs (Economic Development Administration 1988; "Eli Lilly Discloses Plan..." 1992; "Johnson & Johnson..." 1993; "P & G Alliance..." 1993; "Rorer, P&G join..." 1990; Rudnitsky 1991a; Tanouye 1994). This has also allowed firms to enter foreign markets more easily, since many of the joint operations transcend national boundaries. For example, industry leader Merck acquired 51% interest in Japanese manufacturer Banyu in order to gain a stronger foothold in the Japanese market. While not relevant to the time horizon analyzed in this study, industry leader Merck recently agreed to merge with a drug wholesaler Medco, in an attempt to control distribution costs (Conlan 1993).

Finally, prescription drug companies have ventured to build brand awareness of products with consumers by advertising directly to consumers ("New prescription..." 1987; Sheffet and Kopp 1990; Bird 1993; Alperstein and Peyrot 1993; Schrader 1993). As discussed previously, post-war manufacturers simply did not have the incentive to promote directly to consumers until recently. However, the changes in the industry's environment described to this point have encouraged a number of companies to readopt this relatively radical marketing tool. The first manufacturers in recent years to advertise a brand directly to consumers through a mass medium were the British firm Boots, which advertised Rufen, a brand of ibuprofen, and the American firm Merck, Sharp, and Dohme, which advertised Pneumovax, a pneumonia vaccine. In

addition, several firms informed the Food and Drug Administration (FDA) that consumer advertising campaigns were under active development (Federal Register 1985).

This "new" practice apparently took the Food and Drug Administration off guard, and the FDA requested a moratorium in 1983 on the part of all drug makers in order to analyze the practice. The FDA conducted several studies which found several potential problems with the informational aspects of direct-to-consumer advertising (e.g., Morris 1984; Morris, Brinberg, and Plimpton 1984; Morris and Millstein 1984; Morris et al. 1986), but the moratorium was lifted in 1985 without substantive changes in FDA policy. The FDA currently applies the existing physician-advertising rules to consumer-directed ads, so that side effect information (fair balance information) is included in any advertising which mentions both the brand name of the product and the condition the product treats.

However, the FDA and other members of government have continued to express disapproval of the practice on various grounds (for an overview, see Sheffet and Kopp 1990; see also Staff Report 1984; Kessler and Pines 1990; Peck and Rheinstein 1990; Johnstone 1992; Gilgore 1991). Within the past ten years, several manufacturers have advertised brands in several therapeutic classes directly to the public. The results have been mixed (Deutsch 1989; Witcher 1989; Deveny 1992; Reilly 1993; Alperstein and Peyrot 1993; Bird 1993; "Merrell Dow Talks..." 1987), but new and existing products have continued to be introduced and advertised through various broadcast and print media.

Given the environmental factors as described above, the following section will provide and discuss the assumptions about drug marketers and consumers as they will be influenced by direct-to-consumer advertising in a dual-stage context.

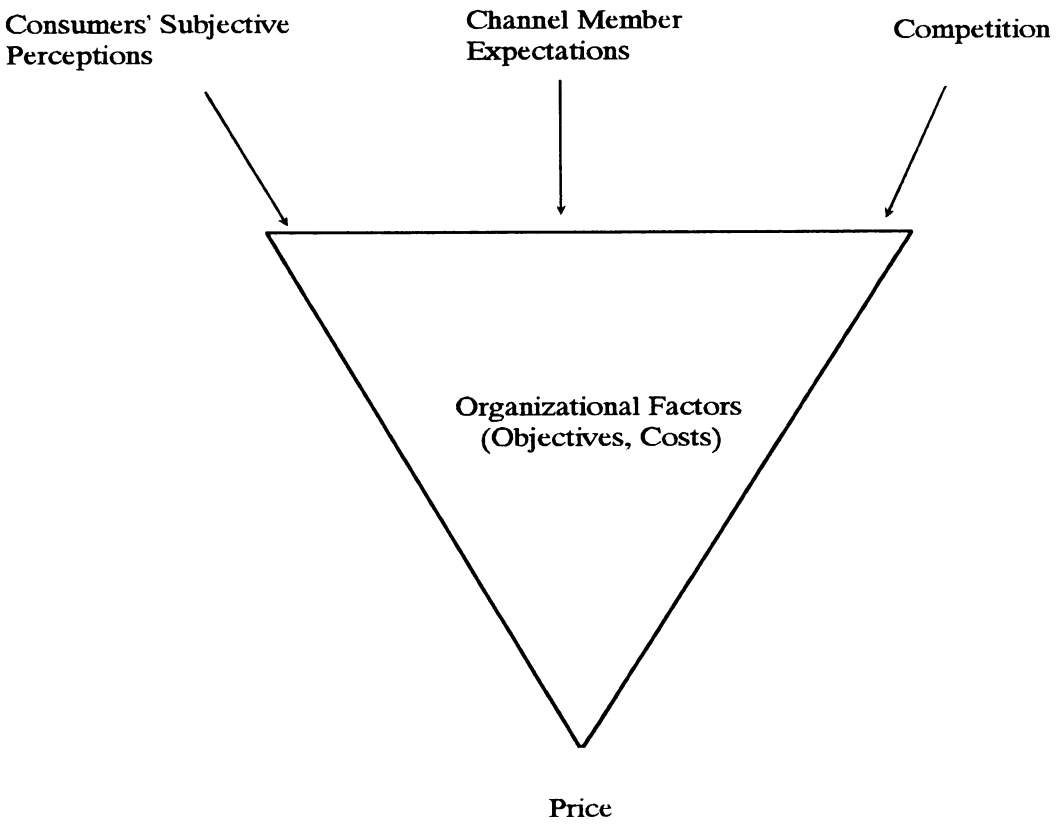
ASSUMPTIONS FOR PRICE-SETTING AND THE VERTICAL PERSPECTIVE

Nagle (1987) has provided a framework which describes the influences on a firm's pricing decisions. Nagle's framework is shown in Figure 3-1. According to Nagle (1987), a firm's pricing environment is delineated by price sensitivity of consumers, competition, and costs. It is with respect to this environment that managers make pricing decisions. Based on those environmental variables, a firm establishes certain strategic objectives and goals, and then takes some specific action to implement the strategy. Using this characterization, with reference to the dual-stage theory described in Chapter II, the following discussion will develop arguments as to how direct-to-consumer advertising would ultimately influence consumer prices in the pharmaceutical industry.

COSTS AT THE MANUFACTURERS' LEVEL

One of the assumptions underlying the prohibition of retail drug price advertising in the 1950s and 1960s was that the advertising may act to increase the primary and/or secondary demand for the advertised products; increased consumption of prescription drugs was assumed to be detrimental (Fletcher 1967). This has also been presented as an argument against manufacturers' brand advertising of prescription drugs (Potter 1988; Staff Report 1984). Following this assumption, if primary

Figure 3-1: Factors in Setting Price (Nagle 1987)



demand were increased, according to traditional industrial economics theories described in Chapter II (Scherer and Ross 1990), a decrease in fixed costs per unit should result from economies of scale. These lower costs would theoretically be passed on to consumers (assuming no marketing intermediaries). Note that this argument does not incorporate the competitive assumptions of information economics, but relies solely on economies of scale. In the present case of brand advertising by drug manufacturers, more people may become aware of health conditions or products available to treat health conditions, such that primary demand may indeed be stimulated.

However, one of the distinctions of the pharmaceutical industry is that economies of scale assumptions do not automatically apply (Walker 1971; Economic Development Administration 1988; Caves, Whinston, and Hurwitz 1991). The technologies used to produce the active chemical entities are batch processes carried out on relatively small scales. Both quality-control considerations and the small absolute quantities of active ingredients produced discourage large-scale continuous process technologies (Walker 1971 pp. 36-37). Furthermore, Steele (1962) has also provided evidence that cost differences among competitors are minimal, and Slatter (1977) stated that drug makers set prices "according to what the market will bear, rather than on any cost plus formula" (p. 29). It is then assumed in this study that manufacturers' costs for individual brands are not affected through the mechanism of economies of scale, and that manufacturers' costs will either increase or stay the same in conjunction with direct-to-consumer advertising. If direct-to-consumer advertising costs increase a firm's total promotional

budget, these costs may be passed straight through to consumers, causing an increase in consumer prices. As described in Chapter II, this has been a primary assumption in industrial economics theory (Comanor and Wilson 1974), and has been among the arguments presented against direct-to-consumer advertising (Staff Report 1984; Hoff 1984; Potter 1988).

The other possibility is that a portion of spending from the traditional promotional efforts of personal selling or journal advertising is simply transferred to direct-to-consumer media, so that total promotional costs remain constant for each firm. If scale economies do not apply, there would be no change in costs. This would be true even if advertising were a "more efficient" means of communicating with potential consumers than personal selling: total costs would remain the same, while total revenues and manufacturers' profits would increase.

Under either of these situations, it is assumed that the gross retail margins for the advertised brands would either 1) decrease relative to the other unadvertised brands if retailers' costs (manufacturers' prices) increased while retail prices remained constant or 2) stay the same relative to unadvertised brands if the retailer simply applied a fixed markup across all brands regardless of manufacturers' price.

PRICE SENSITIVITY

Several factors may influence the price sensitivity of consumers (Assael 1992; Kanetkar, Weinberg, and Weiss 1992; Krishnamurthi and Raj 1985; Monroe 1973; Nagle 1987; Wittink 1977; Zeithaml 1988). For prescription drugs, not only must the price sensitivity of the end consumer be

considered, but also the price sensitivity of the prescribing physician. The following discussion will consider the relevant elements of price sensitivity and how advertising might influence those elements.

Price sensitivity of consumers

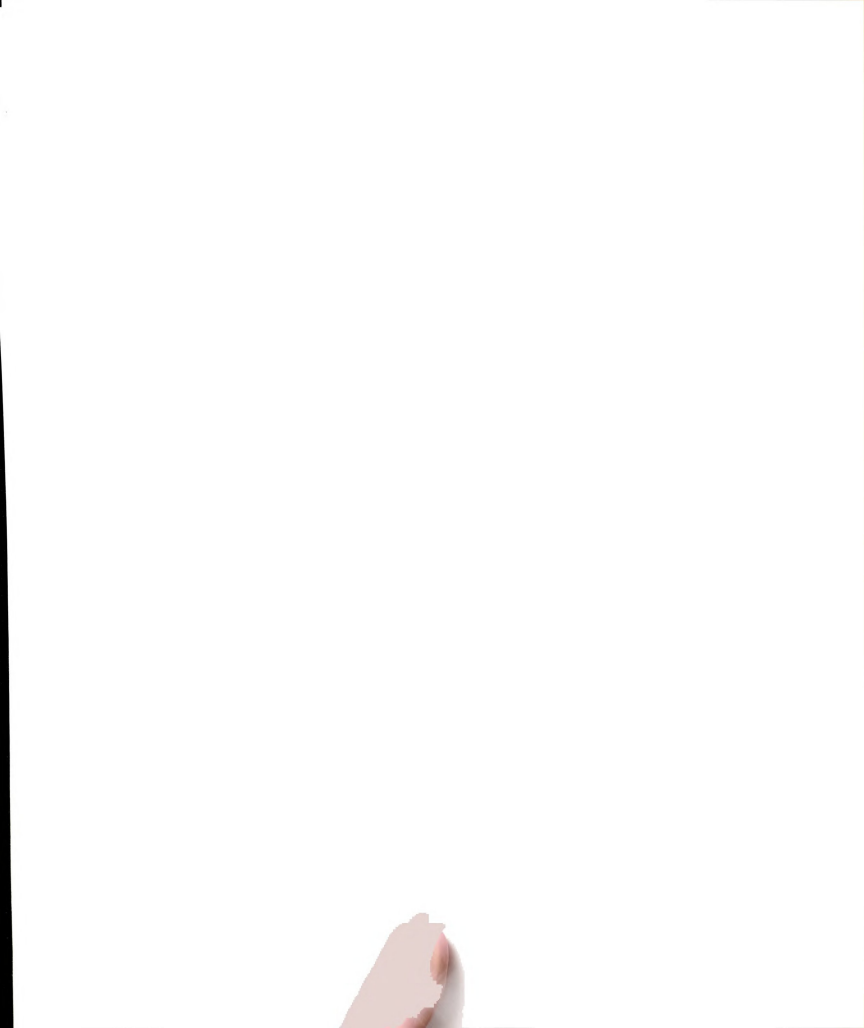
It will be maintained in the following discussion that if consumers are given information which enables them to make competitive choices, they may be price insensitive when considering brands within therapeutic classes, but will be more price sensitive when considering intrabrand competition among retailers. That is, consumers who become aware of a medical condition or a treatment for a condition will be more likely to search for the lowest priced 1) manufacturer and/or 2) retailer. According to the dual-stage theory, this in effect creates more price competition at the retail level than at the manufacturers' level, thereby driving down retail margins.

Industrial organization theorists have assumed that consumers of prescription drugs are relatively price insensitive, and that this allowed manufacturers a great deal of leeway in their pricing practices (Backhaus 1983; Caves, Whinston, and Hurwitz 1991; Comanor 1964; O'Reilly 1991; Walker 1971). Price sensitivity of consumers for a given therapeutic treatment may be relatively low for several reasons. A patient may need a remedy for an ailment and the choices which exist are either to treat the ailment or forego the purchase. Some consumers may not comply with a prescribed medication if it is too expensive (Smith 1983, pp. 88-114), so the price sensitivity may be very low but not zero. At the same time, individual patients are unlikely to purchase

larger quantities of a product even if prices decrease by a large percentage, since the quantities available are controlled by the prescribing physician (although as described below, physicians may prescribe more units per prescription to conform with maximum allowable cost standards).

The price sensitivity of consumers for brands within a therapeutic class may also be relatively low for other reasons. First, interbrand sensitivity may be low if the consumer is unaware of other similar treatments. This is the core of the information economics argument, and may be more likely if the consumer has not entered the market previously or is not informed about potential substitutes. It is therefore to the brand manufacturers' advantage to maintain consumer ignorance about potential branded or generic substitutes for a given treatment, or to differentiate the brand even further (for example, through extensive consumer-directed advertising).

Second, although there may be equivalent treatments available and the consumer is aware of these treatments, consumers may find it difficult to compare complex product attributes along with prices. They are therefore more likely to pay (or continue paying) for a known brand (or manufacturer) rather than risk the potential cost of an unknown. Statman and Tyebjee (1981) stated that "the consumer who buys the drug is the most receptive to price considerations but lacks the technical ability to evaluate alternatives to the prescribed brand name" (pp. 76-77). In lieu of complex information which the consumer may not understand, the consumer may decide to accept brand or company name that



s/he is more familiar with, or may more willingly accept the phycisian's prescribed brand, and may be less sensitive to price. Third, consumers may be more price sensitive to more expensive treatments, or to treatments which are longer-term rather than temporary. Reuben and Wittcoff (1989) stated that "patients who require frequent repeat prescriptions are more likely to make efforts to reduce their costs" (p. 40). Fourth, it is likely that consumers are less sensitive to prices of various brands if some of the purchase cost is assumed by a third party (e.g., insurance or Medicaid).

Finally, a perceived positive relationship between price and quality may also affect consumers' price sensitivity. It has been observed that consumers perceive definite differences in the quality, efficacy, and value of generic and branded drugs (Kelley 1986; Masson and Steiner 1985; Podulka et al. 1989; Tootelian, Gaedeke, and Schlacter 1988; Walker 1971). The perception of quality in a higher-risk product like prescription drugs may be one of the reasons for the drug brand loyalty observed in other studies (Masson and Steiner 1985), and the relatively small and stable percentage of the market which generics continue to hold (Simpson and Neff 1990).

While manufacturers as market leaders have a vested interest in maintaining these perceptions (Hoch and Deighton 1989; Schmalensee 1982), it is questionable whether any quality differences exist between branded drugs and generics. First, the quality of the generic drugs may be no less than that of branded drugs. Reuben and Wittcoff (1989) observed that 80% of generics are manufactured by large research-based

firms -- the same firms which produce patented drugs in other therapeutic classes (see also Naik 1994). Other studies have also assumed that generics and branded drugs were of equivalent quality on that basis (e.g., Merline 1989; Pelton, Strutton, and Smith 1993; Statman and Tyebjee 1981; Walker 1971). Second, not only may the quality of generics be at least as high as that of brands, but the quality of branded drugs may be questioned as well. A recent issue of Consumer Reports stated that one heavily promoted brand was effective in only 40 percent of the patients treated, and that the effectiveness itself was limited ("A question of health" 1991).

Given the complexity of the products, the complexity of the purchase process, and the relative complexity of the information available, marketing strategists in the patented or branded drug category would likely choose to denegrate the quality or other (nonprice) properties of the competition; generic manufacturers would likely attempt to minimize the perceived differences among products (Hoch and Deighton 1989). Indeed, some of the promotional strategies initiated by brand manufacturers seem intended to magnify the faults of generic competitors, while generic manufacturers and government agencies insist that qualities are equivalent (Walker 1971; "The big lie..." 1987; "Miracle Drugs..." 1992). Regardless of whether these quality differences actually exist, the assumption here is that the perceived differences lead consumers to be relatively insensitive to price differentials among competing brands.

According to the dual-stage theory, in non-drug categories this would create a situation where consumers would search among retailers for a specific brands ("salient" brands), and retailers would then compete on the basis of product line and price for the advertised brands. In the case of prescription drugs, however, retailers in effect carry all brands, and so may be forced to compete more on the basis of price. The retailers in this situation are passive in terms of the retail penetration of the brands which they carry, but will be assumed to make independent decisions regarding their prices. If consumers are given the opportunity to make decisions about the advertised products, they may indeed become more sensitive to the retail prices of the advertised brands.

For example, the research cited in Chapter II which compared retail drug prices in states that allowed retail advertising and prices in states that did not allow retail advertising provides evidence that price differentials are indeed considered by consumers when deciding at which pharmacy to make their purchase (Cady 1975, 1976). Not only were average prices lower in states which allowed advertising, but the dispersion of prices was lower, suggesting that retail pharmacies made changes in their prices as a result of consumer price sensitivity. Further evidence of consumers' retail price sensitivity has been shown more recently as prescription drug consumers travel across international borders to purchase lower-priced prescription drugs (Solis 1993), as well as consumers' decisions to purchase prescription drugs through relatively less costly mail-order pharmacies.

It is argued here that brand advertising will have a negative effect on the intrabrand price sensitivity of consumers, and that this will be reflected in lower retail margins. Given the assertions of information economics theory (e.g., Nelson 1970; Stigler 1961), the mere presence of an alternative brand could prompt some curiosity on the part of the consumer as to the existence of competing brands, leading to increased price sensitivity. In some product categories, where there may not be significant differences among available treatments -- even among patented brands -- this assumption of increased price sensitivity may be particularly applicable (O'Reilly 1991).

Price sensitivity of physicians

Because physicians act as "middlemen" (Krieger 1983), "learned intermediaries" (Brett and McCullough 1986), "gatekeepers" (Poulsen 1992), or as "surrogate consumers" (Solomon 1986), they control not only the physical flow of the products but also much of the flow of information about the goods. As participants in the prescription drug purchase decision, the price sensitivity of physicians is of particular importance to manufacturers. Drug manufacturers have continued to depend largely on personal selling to encourage brand loyalty (Bauer and Wortzel 1967; Temin 1979b; Gagnon 1983; Pitt and Nel 1988), which is intended to influence the demand for drugs (Economic Development Administration 1988). The advent of direct-to-consumer advertising represents an attempt by drug companies to divert the informational flow in order to affect the physical flow.

It has been argued elsewhere that physicians do not consider the prices of drugs when prescribing (Vernon 1971; Lall 1974; Temin 1980; Masson and Steiner 1985; Caves, Whinston, and Hurwitz 1991; O'Reilly 1991). However, other studies have asserted that doctors are sensitive to the prices that consumers pay when they may be influenced by consumers' preferences for specific (not necessarily lower-priced) medical treatments (Kessel 1958; Miller 1974; Reekie 1978; Statman and Tyebjee 1984; O'Reilly 1991). As Reekie (1978) stated,

> (p)atient price awareness will reinforce prescriber price consciousness. When a disease is one which requires maintenance therapy (e.g. rheumatism) as opposed to a one-off [sic] regime (e.g. infections) a fortiri this effect will be enhanced (p. 234).

Statman and Tyebjee (1984) corroborated this by reporting that the proportion of prescriptions written generically (i.e., without specification of a brand name) increased from 8.2 percent in 1968 to 14.7 percent in 1980, indicating that indeed physicians were sensitized to drug prices following the repeal of anti-substitution laws. Walker (1971) assumed that as physicians find out more information about "new" drugs, they perceive more homogeneity among all competing brands within a product class. Further, Walker also presented evidence that physicians were more sensitive to the prices of drugs which they administered themselves (e.g., an injection in the office) than to the prices of drugs which they would prescribe. Cocks (1975) also produced evidence that this price sensitivity would increase over the life cycle of the product.

The specific mechanism merits further research, but the present study will assume that physicians are not sensitive to prices which consumers

pay but that their prescribing behavior may be influenced by patient requests. Further, this study will assume that consumers' price senstitivities are influenced by manufacturers' advertising by way of encouraged brand awareness.

COMPETITION

Direct-to-consumer advertising has emerged as an upshot of the increased difficulty in differentiation within the channel, since generics and brand substitutes ("me-too" drugs) may represent a threat to the manufacturers' profitability of existing brands. While an existing brand may indeed maintain its leadership within a therapeutic class, potential marginal decreases in market share may outweigh the potential marginal costs of consumer advertising which could help extend the brand's leadership. According to the dual-stage approach, as the manufacturer attempts to differentiate its brand around the channel, margins for the retailer should decline (Steiner 1984).

The following discussion describes different types of competition which exist at the manufacturers' level in the pharmaceutical industry. This includes the use of therapeutic classes as a means of delineating interbrand competition, as well as the role which patents, patent expirations, and over-the-counter switching play in the competitive process. The second part of the discussion describes the dynamics of competition at the retail pharmacy level. The third part of the discussion will examine intrachannel (vertical) relationships and how these relationships affect retail margins and consumer prices.

Factors affecting competition at the manufacturers' level

Reuben and Wittcoff (1989) have characterized competition in pharmaceutical manufacturing on three bases. First, several companies may manufacture and market the same chemical drug. For example, tetracycline is no longer covered under a patent, and there are dozens of firms which make and distribute it. According to Reuben and Wittcoff, "[p]rice and the reputation of the company may be selling points; the situation is little different from consumer goods generally" (p. 30). A second type of competition is that which exists among "me-too" drugs, which all serve the same therapeutic purpose, but are all covered under different patents since they are chemically different. An example would be that which exists among the different types of nicotine skin patches which are prescribed as smoking cessation treatments (Deveny 1992). A third type of competition occurs as competitive innovation, where a firm attempts to "displace another patent-protected drug from the market or treat a hitherto intractable disease" (p. 30). Reuben and Wittcoff assert that this process brings the greatest potential for profit, but also brings the greatest risk to the manufacturer.

As industry analysts have observed, the prescription drug industry continues to compete on the basis of creativity (Economic Development Administration 1988; Waldholz 1992; O'Reilly 1991). In order to maintain strongholds in each therapeutic class, firms attempt to develop "new" drugs and to introduce these new products as quickly as possible. However, expenditures on promotional activities in 1991 were estimated to be $1 billion greater than spending for research and development

(Rudnitsky 1991a). As discussed above, the marketing expenditures have included not only increased advertising toward physicians, pharmacists, and consumers, but have also included other promotional practices which have been called into question by lawmakers (Staff Report 1991; Thompson 1991).

Therapeutic classes

As previously stated, this study will compare changes in price over time between brands within the same "product category." These product categories will be delineated by the use of therapeutic classes. Therapeutic classes are viewed as groups of products which are similar in the diseases they treat and in the biochemical character of the treatment (Comanor 1964; Vernon 1971; Cocks 1975; Hornbrook 1978; Statman and Tyebjee 1981; Grabowski and Vernon 1992; Maness and Wiggins 1992). Previous researchers have also assumed that products within therapeutic classes are also similar on the bases of manufacturing costs and equipment, in FDA testing and review procedures, and in other regulatory conditions across products (Caves, Whinston, and Hurwitz 1991; Maness and Wiggins 1992).

The success of each firm tends to rely heavily on the sales of a brand in a therapeutic class. The costs of development for each drug are estimated to be between $187 million (DiMasi et al. 1991) and $231 million (Vagelos 1991a; O'Reilly 1991) per approved brand, with very few commercial successes. The costs of development are regained largely by the success of a single brand or a very few brands in different therapeutic classes (Spilker 1989). A firm then has a high interest in

seeing a successful brand continue as a market leader, particularly in large markets. Further, a firm may introduce "extensions" of existing brands within therapeutic classes -- either minor chemical changes or changes in delivery systems (e.g., patch versus pill) -- rather than introduce new brands in the same therapeutic class.

Contemporary research considers the marketing and research competition within therapeutic classes to be rigorous (Telser, et al. 1975; Temin 1979b; Hornbrook 1978; Caves, Whinston, and Hurwitz 1991; Maness and Wiggins 1992). Therefore, the assumptions of this research are that the substitution between product categories is low, so that there is little influence of the pricing decisions for one therapeutic class on another (e.g., the price of antihistamines is not affected by the price of antihypertensives). Further, it is assumed that the substitution among brands and delivery systems within product categories is relatively high (Comanor 1964; Vernon 1971; Hornbrook 1978; Caves, Whinston, and Hurwitz 1991).

Regulation at the Manufacturing Level: Patents and Switchovers

Regulatory changes may affect the competitive structure (and have largely been intended to do so) at the manufacturing and retail levels, and may affect the individual firms' price-setting decisions at either level. Some of the regulatory changes should have a universal effect on all products, while others may have more selective effects on specific classes. Of particular importance to manufacturers are the potential effects of patent protection and prescription-to--OTC switching.

Several studies have observed the effects of patent expiration on competition in the industry. Statman and Tyebjee (1981) have suggested that drug patent expiration caused little distress for patent-holding firms in terms of market share and price. Their theory was that while a product is under patent protection, the brand name develops loyalty from physicians and consumers. When the patent expired, the trademarked brand name provided extended market share protection because of this loyalty. This study was conducted, however, prior to the 1984 Drug Act, which was intended to encourage the substitution of generics upon the expiration of a brand's patent. Studies which followed and accounted for the possible effects of the 1984 Drug Act (Grabowski and Vernon 1992; Caves, Whinston, and Hurwitz 1991) have concluded that "pioneer" brands lost little in the way of market share, and in fact, these brands continued to raise prices upon the entry of generic competitors. Interestingly, there were significant decreases in the average price and dispersion of prices of the generic brands over time, while the pioneer brands continued to raise prices at the pre-expiration rate (Grabowski and Vernon 1992). Observation of the pricing behavior of branded and generic drugs shows in some cases that generics compete on the basis of price while brands continue to increase prices (Edelstein 1991; Grabowski and Vernon 1992), which suggests some form of non-price competition.

As mentioned above, switching to over-the-counter status for a branded drug may help the manufacturer in several ways. Over-the-counter status not only allows access to a larger market, but also provides for fewer advertising and distribution restrictions. During the 1980s, a large

number of prescription drugs were approved for availability without a doctor's prescription, and many of the major brands in some categories are now awaiting OTC approval (Abelson 1992).

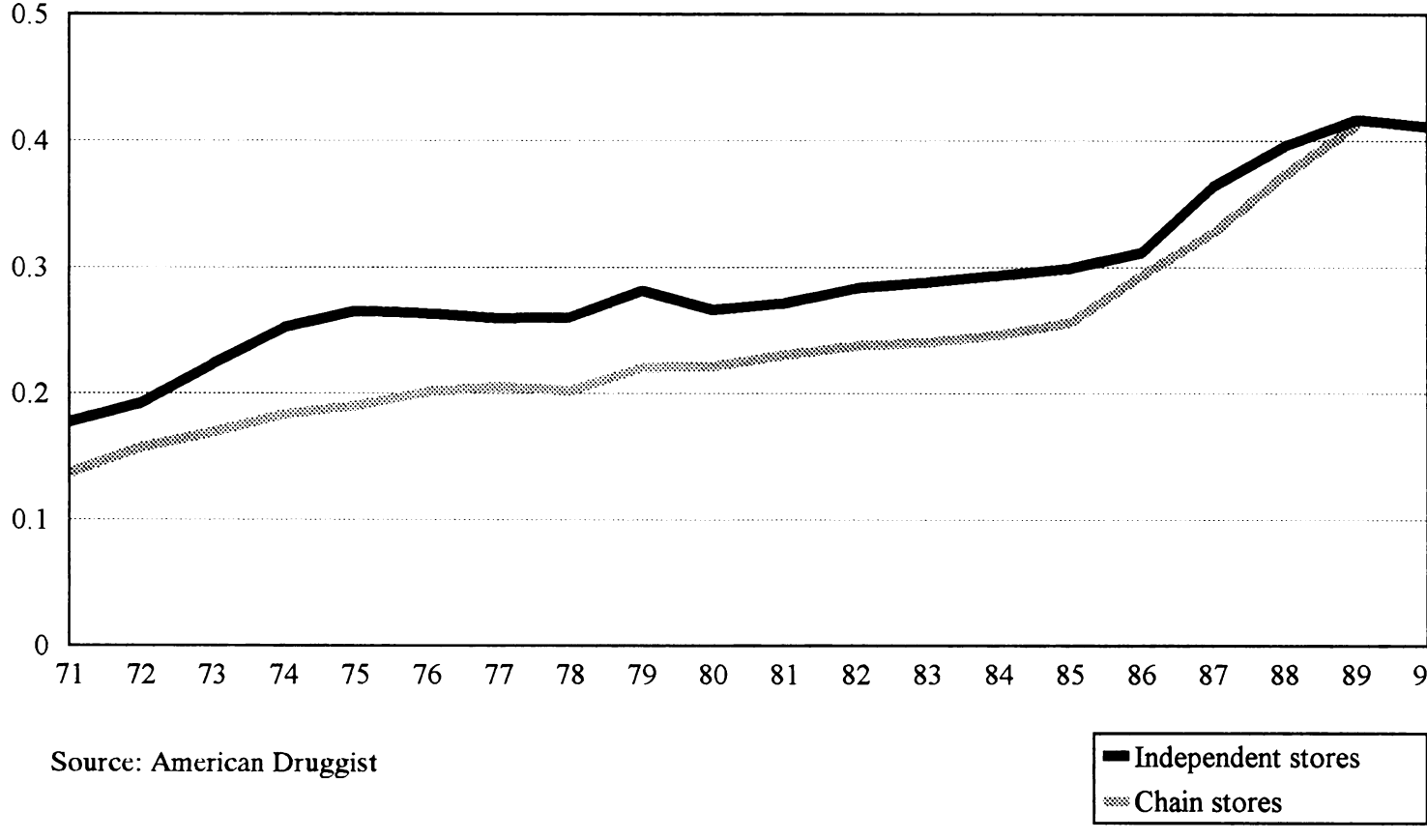
Factors affecting competition at the retail level

As mentioned earlier in this chapter, the environment in which retail pharmacies operate has also undergone significant changes. This section will describe how these changes affect retail competition and retail prices. Of particular interest are third-party payments for drugs, retail advertising, and new forms of retail competition.

Third-party payments

As mentioned above, the partial or complete payment of consumer drug costs by insurance or governmental agencies has a significant effect on whether a pharmacist will substitute (Simpson and Neff 1990; Smith, Monk, and Banahan 1991; Pelton, Strutton, and Smith 1993). This may increase retail competition, in effect causing lower retail prices or margins, or it may actually increase prices in geographic areas with large populations of patients under government-paid reimbursement programs (Koorhan 1983). In fact, third-party payments have been cited as one reason for the dramatic increase in the average prescription price since the mid-1970s. The percentage of prescriptions dispensed by independent drug stores under third-party payments increased from 21% in 1974 to 41% in 1990 (see Figure 3-2). Since most third-party programs specify a maximum quantity of medicine to be dispensed on one prescription by the retailer, physicians frequently prescribe this maximum amount, thus increasing the number of units dispensed per

Figure 3-2: Third party payments as a percentage of total prescription sales



Source: American Druggist

prescription, and raising the total cost ("Third-Party Prescription..." 1974). It will be assumed in this study that third-party payments affect prices of all drugs in the same therapeutic classes in the same manner (Caves, Whinston, and Hurwitz 1991; Maness and Wiggins 1992).

Retail Advertising

At the retail level, advertising has been restricted in many states in many forms. For example, until the late 1970s, Michigan forbade corporate-owned pharmacies from identifying themselves as "drugstores" (Fletcher 1967). Professional associations, including the American Medical Association and many state-level pharmacist groups, restricted advertising of drug prices at the retail level on the premise of maintaining professionalism. Other states prohibited retail pharmacies from advertising discounted prices.

There were apparently two assumptions underlying the restrictions on retail drug (price) advertising (Fletcher 1967): first, critics argued that the advertising would increase the aggregate consumption of drugs, and second, it was argued that the cost of the advertising would be passed on to consumers. Since drugs were only available through prescription, however, doctors would act as gatekeepers to the acquisition and consumption of the product. On this basis, the retail price advertising of prescription drugs would not increase the consumption of the products by existing or potential users, since consumers would only be able to purchase enough of the product to remedy their condition.

Counter to the second argument of increased prices, empirical studies (Cady 1975, 1976) have provided strong evidence that retail prices of drugs were in fact lower in the states which allowed retail price advertising.As discussed above, states which imposed restrictions on pharmacy price advertising demonstrated higher retail prices (Cady 1976). An interesting question which arises -- and one which has not been empirically tested -- is whether the higher retail prices observed in the 1970s were a result of higher manufacturer prices, or whether the retailers accepted lower margins on the price-advertised brands. It is unlikely that lower prices in less restrictive states stimulated an increase in either the primary (product) or secondary (brand) demand for these products, but rather created or increased price competition at the retail level[1]. Retail advertising which lowered retail prices may have increased the total demand for other types of products discussed above, such as gasoline or even prescription eyewear (since consumers may purchase more than one pair of prescribed glasses), allowing retailers to increase total revenue through added volume. Analysis of this question may produce further insight into the dynamics of the prescription drug distribution system.

Changes in retail competitors

Figures 3-3 and 3-4 show the changes in the number of independent and chain retail drug outlets and their sales for the past twenty years. While the number of independent retail stores has declined, the number

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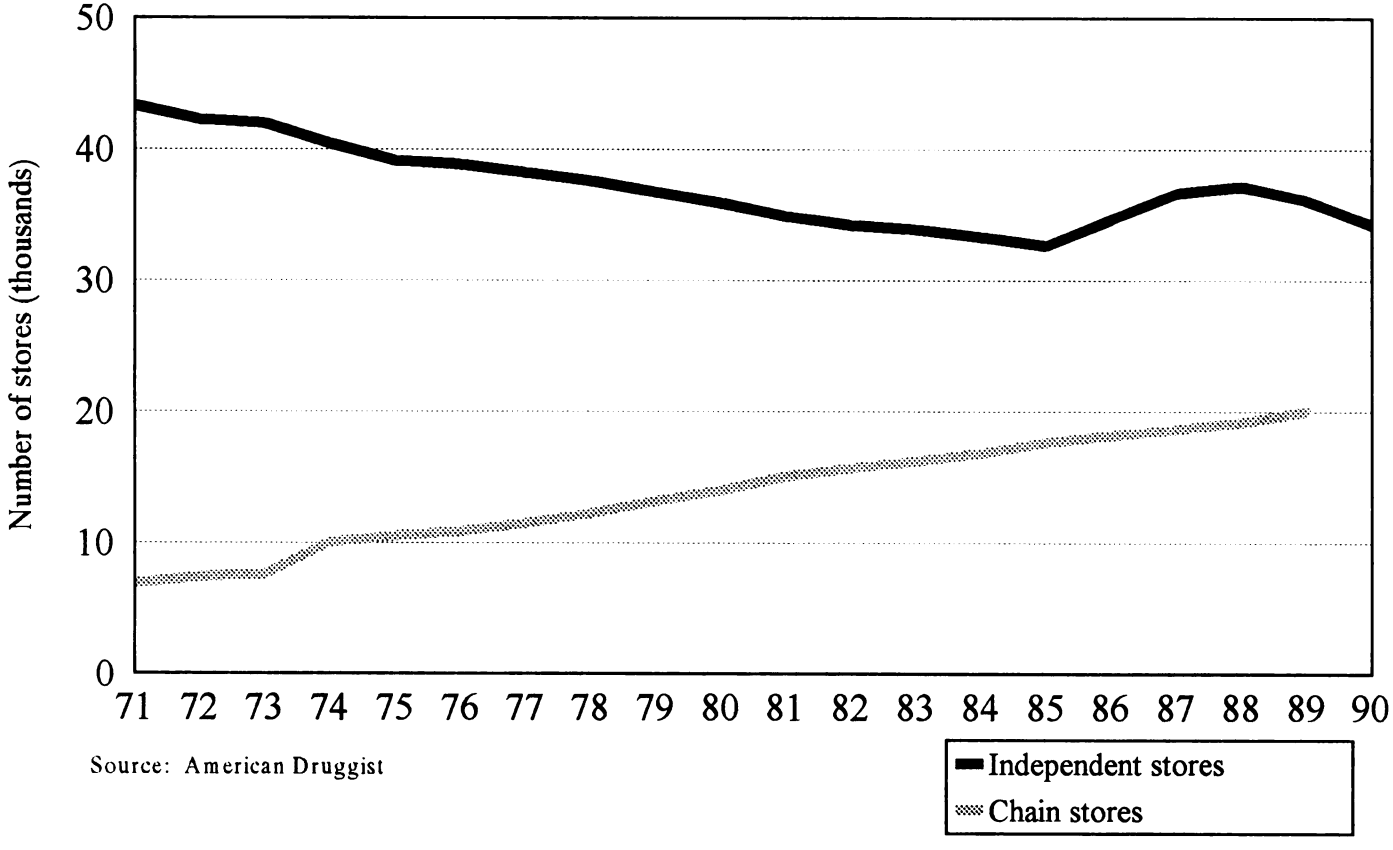
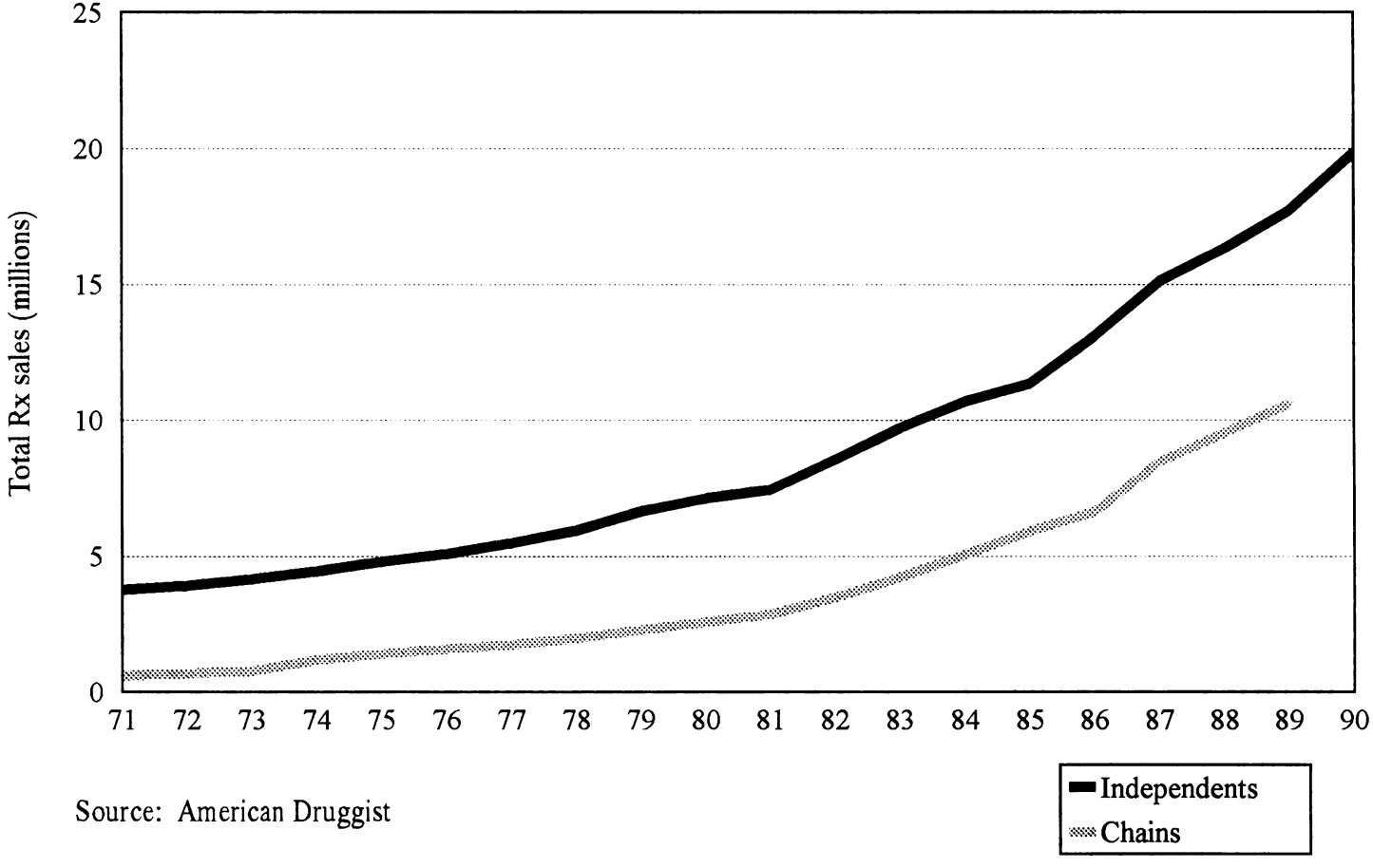
[1]Decreasing profit margins were indeed observed in the late 1970s, and were attributed to an increase in retail competition and higher manufacturers' prices, but not directly to advertising (Brookman 1981).

Figure 3-3: Number of chain and independent pharmacies



Source: American Druggist

Figure 3-4: Total prescription sales, independents and chains



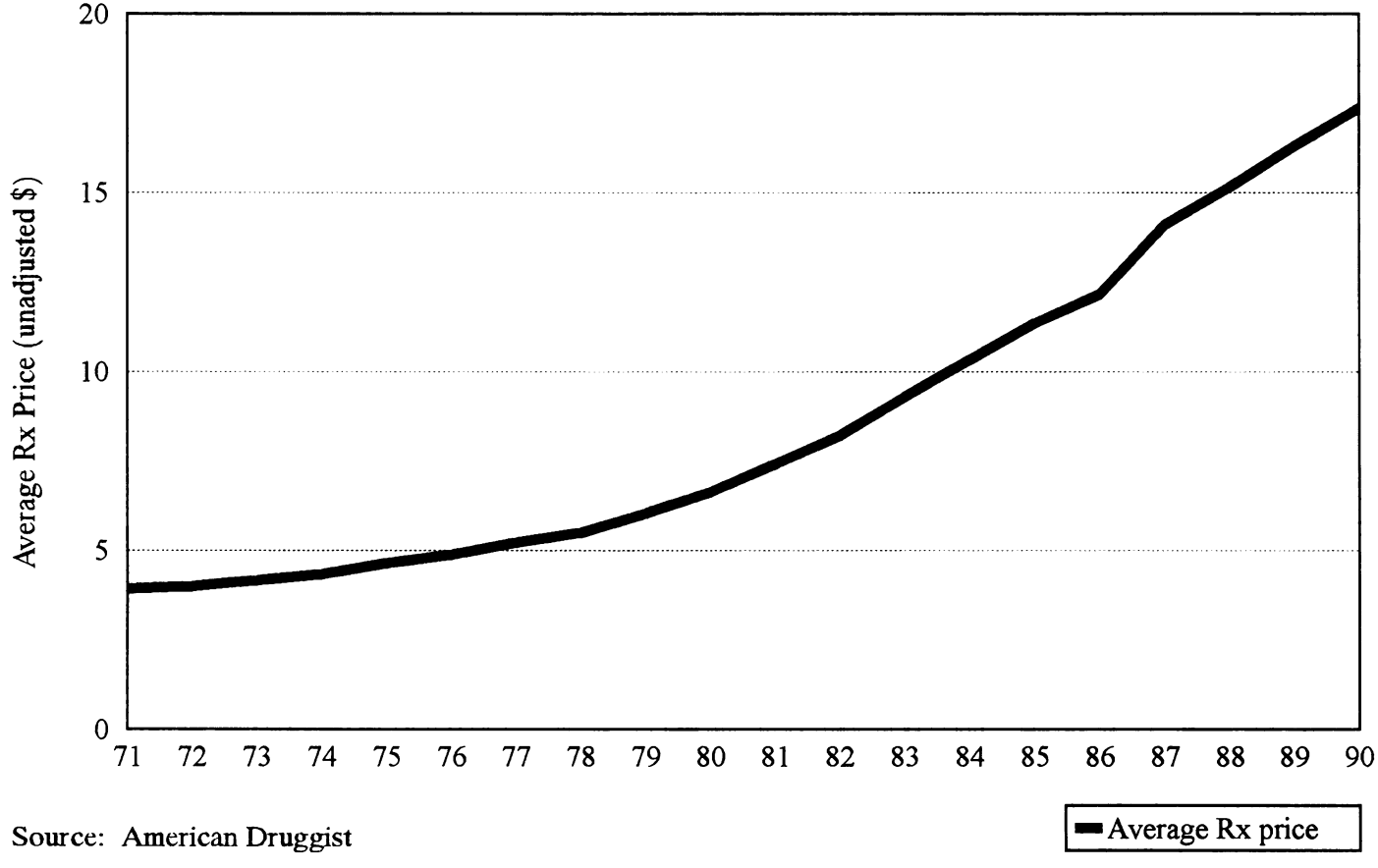
Source: American Druggist

of chain stores has tripled (Figure 3-3). Independent stores still outnumber chain stores. Figure 3-4 shows that total sales of prescription drugs are dominated by independents, even though the average prescription price is now slightly higher at the average chain store (see Figure 3-5). In 1989, the average chain store had total revenues nearly four times as great as the average independent pharmacy (Siegelman and Feierman 1990).

The development of new types of retail outlets for drugs has also put further pressure on retail prices. As described previously, prescription drugs are now available by mail order. Independent pharmacies seem to be more vulnerable to mail order dispensing than chains (Siegelman and Feierman 1990). Another threat to independent pharmacies has been that of supermarket pharmacy dispensing. In 1983, only about 8% of supermarkets carried pharmacies; this percentage increased to 15% in 1990. Supermarkets were projected to dispense about 25% of all prescriptions in 1992 (Spalding 1990).

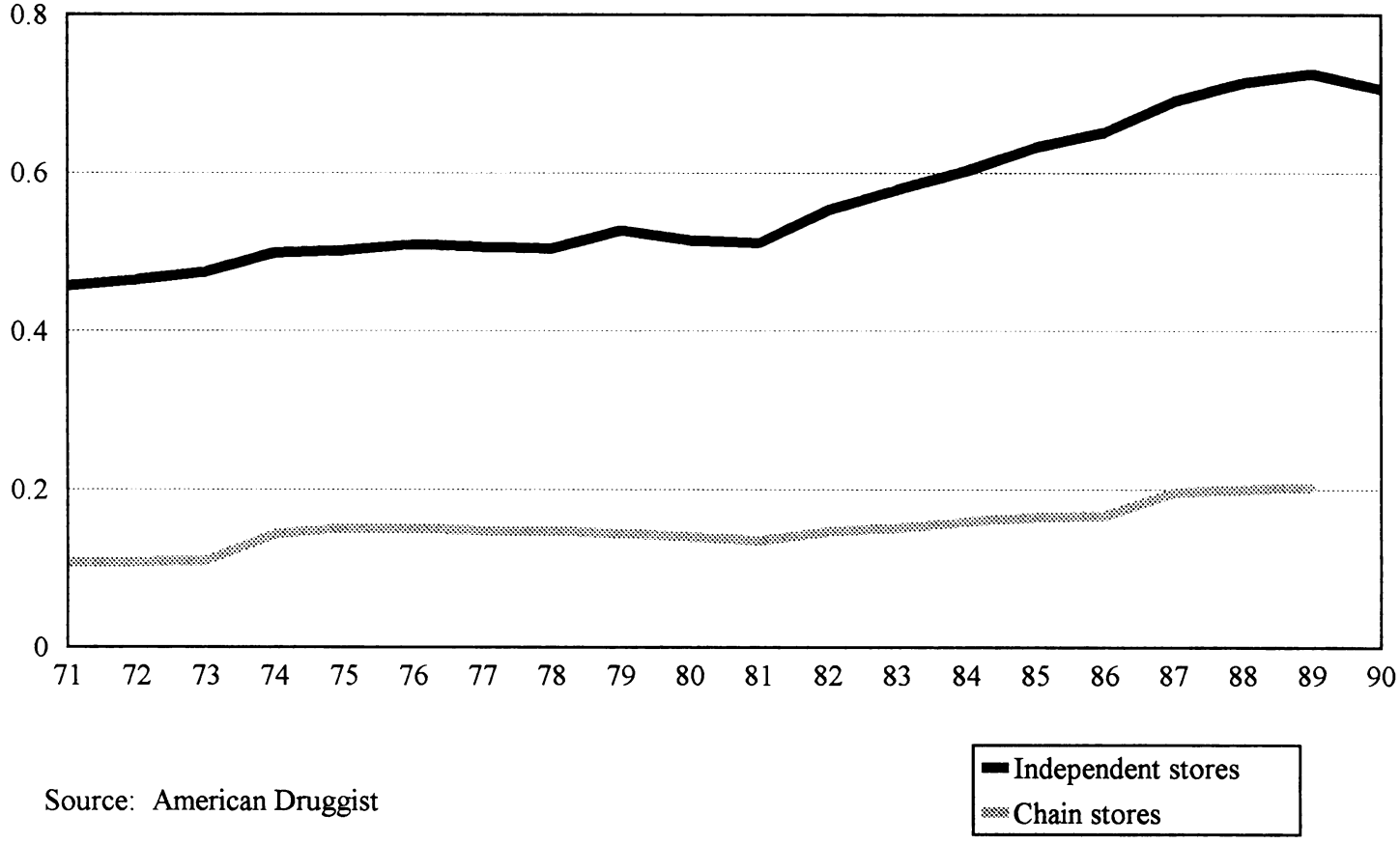
Cumulatively, these newer types of prescription drug dispensing represent increased competition at the retail level. This may mean lower prices (hence lower gross margins for retailers), or competition on other bases such as extended service or product line (Wall Street Journal 1993). Figure 3-6 shows that the percentage of sales dependent upon prescription drugs increased more for independents than for chain stores, suggesting that chains may tend to compete by offering a more extensive non-drug product line, while independents offer more extended consultation services. If the dual-stage assumptions are applicable in

Figure 3-5: Average prescription price (unadjusted dollars)



Source: American Druggist

Figure 3-6: Prescription sales as a percentage of total revenue



Source: American Druggist

the case of prescription pharmaceuticals, gross margins on advertised brands of drugs should be squeezed even further. It would also appear that chains and independents would seek to decrease their dependence on the prescription product category in order to maintain or increase profits, but the next section will show that their dependence on the product group has actually increased.

Intrachannel competition: bargaining power at different levels of distribution

An earlier section of this chapter has described the shifting of relative power within the channels of distribution in this industry. Pharmacists once wielded considerable strength within the channel because they compounded the consumed products themselves and no prescription was required. The advent of research- and technology-driven manufacturing, as well as the evolution of prescription purchasing has removed a tremendous amount of the power of the retail pharmacist. In fact, Porter (1974) maintained that because the "druggist merely fills the prescription" (p. 427), retail drugstores should be categorized as convenience outlets.

Drug retailers have become more reliant on prescription sales as a source of revenue, even though gross retail margins for prescription drugs have been observed to decrease overall ("HCFA Study..." 1990). Figure 6 shows that the prescription drugs have accounted for an increasing percentage of total sales from 1976 to 1990 for both chain stores and independent pharmacies. During roughly this same time period, however, the retailer's average gross margin on prescription

drugs decreased from 35.3% in 1981 to 26.4% in 1988 ("HCFA Study..." 1990). Further, Grabowski and Vernon (1992) provided evidence that, in a sample of 15 therapeutic classes, the retail gross margins were lower for "pioneer" (branded) drugs than the margins for generic equivalents, similar to the relationship suggested by Albion (1983) for grocery items.

It would seem that retailers would attempt to decrease their dependence on a product category which offers them decreasing margins. In this case, the decline in gross margins may be offset by an increase in total volume of prescriptions sold, and by the fact that increased generic sales offer still larger total revenues. In addition, annual reports on the retail drug industry (e.g., Drug Store News) show that the margins for prescription products are still relatively larger than those for other products sold by retail druggists. It is also likely that inflation in drug prices has outpaced that of other pharmacy products, which would be partly responsible for the increased percentages of revenue. However, retail drug outlets still rely heavily on drug makers for their survival.

However, as patents expire on larger-market products, and the development of entirely new products has continued to decline (Statman and Tyebjee 1984), substitution at the retail level (either by physician or pharmacist) may represent a threat to a manufacturer's dominance, hence its ability to avoid price competition, within some therapeutic classes. Given that consumers have attempted to become more active in their own diagnosis and treatment, and given the increased potential for

substitution by either the physician or the pharmacist, the re-emergence of drug advertising to consumers suggests that in some important therapeutic classes the makers of these drugs wish to encourage brand loyalty on the part of the retail/consumer end of the distribution channel. A comparison of the prices of those brands which are differentiated primarily by the manufacturer to the prices of those brands which are differentiated more at the consumer level may suggest that the while the retail pharmacist is largely dependent upon the manufacturer, the direct-to-consumer advertising of drugs amplifies this relationship. The increased, and redirected, promotional efforts of manufacturers may indeed squeeze these margins even further.

THE EFFECTS OF DIRECT-TO-CONSUMER ADVERTISING ON CONSUMER PRICES OF DRUGS: THE DUAL-STAGE THEORY AND THE HIDDEN EFFECTS OF MANUFACTURERS' ADVERTISING

The preceding description of the pharmaceutical industry indicates that since the advent of branded, patented drugs, the retail pharmacist has lost considerable control over the actual distribution of drugs. It has also been shown that while regulators have attempted to increase competition at both the manufacturers' and retailers' levels, drug makers have attempted to maintain or regain their dominance in the distribution channel through various promotional tactics.

If the efforts of drug manufacturers have been successful, according to the dual-stage approach, then two changes would be observed. First, brand retail margins should be reduced. The differentiation efforts of the manufacturers should in effect increase price competition at the

retail level, decreasing the relative brand gross margins for the advertised brands (Albion and Farris 1987; Farris and Albion 1980; Liebermann and Ayal 1985; Porter 1974; Steiner 1984).

Second, retail penetration, operationalized by Liebermann and Ayal (1985) as the number of retail outlets carrying a brand, should increase only as the number of drug outlets increases, since virtually all brands of drugs are available at all pharmacies (if not stocked in-store, then available to the retailer through the store's wholesaler). Albion's (1983) operationalization of retail penetration, which was measured as brand sales within a single retail chain, would only increase if the promotional efforts of the drug makers were successful in stimulating latent demand for the advertised brands, i.e., more consumers would buy those brands. Applying this situation to retail pharmacies, the competition among retailers would then still be based on price rather than product line, since drug product lines remain constant across stores. Again, margins should be observed to decline as a result.

Previous researchers have then interpreted these lower retail margins to represent relatively lower consumer prices (Albion 1983; Albion and Farris 1987; Lynch 1986; Steiner 1984). As the manufacturer gains power in the channel through its consumer-directed differentiation efforts, the retailer applies lower margins per unit for the advertised brands than for the other unadvertised brands. In other words, the cost to the consumer is relatively lower for the advertised brands, since the retailer is making a pricing decision unrelated to the manufacturer's price and is not applying a fixed margin across all brands or all

product categories. Through this mechanism, the following two chapters will provide evidence that the initiation of direct-to-consumer advertising relatively decreases the costs of the brands to consumers.

The following chapter will delineate the methodologies which will be used to address this issue, given the theory which has been developed and the specific characteristics of this industry.

CHAPTER IV

HYPOTHESIS DEVELOPMENT AND METHODOLOGY

Chapter I presented the hypotheses to be tested in this study. This chapter describes the rationale behind those hypotheses, the variables to be analyzed, the sources of data, and the methods to be used to test the hypotheses.

HYPOTHESIS DEVELOPMENT: BRAND GROSS MARGINS AT THE RETAIL LEVEL

Chapter II has provided a discussion of the dual-stage theory, which describes the effects of manufacturers' advertising on retail margins within distribution channels in different product categories. Chapter III described the prescription drug industry from a dual-stage perspective and provided the assumptions regarding the characteristics of the products and consumers. The following research hypotheses will test relationships which describe 1) the differences between retail gross margins of the advertised brands before and after the initiation of direct-to-consumer advertising, 2) the differences observed between the gross retail margins for the advertised brands and the gross retail margins for the Top 120 brands in time periods before and after direct-to-consumer advertising is initiated, and 3) the differences observed between the gross retail margins for the advertised brands and the gross retail margins for other brands within the same therapeutic classes in

the time periods before and after direct-to-consumer advertising is initiated.

Advertised brands before and after direct-to-consumer advertising. Given discussion in Chapter III about the nature of the purchase process and the competitive relationships among distributors of prescription drugs, the dual-stage theory would suggest that direct-to-consumer advertising has effects in the prescription drug industry which are similar to those observed in other product categories. Since drug manufacturers are attempting to differentiate their brands, retail brand gross margins for the advertised brands should fall after the initiation of direct-to-consumer advertising. The following three hypotheses will test for differences in retail margins before and after direct-to-consumer advertising begins. Retail margins are measured in dollars and by percentages, consistent with the marketing literature (Lieberman and Ayal 1985; Albion 1983) and with previous industry research (Thomas and Schondelmeyer 1992).

Research hypothesis one:

For those brands of drugs which began advertising within the specified time horizon, the average retail brand gross margin decreases after the initiation of direct-to-consumer advertising.

For the advertised brands:

H_{1a}: The average retail brand gross margin measured in dollars decreases after the initiation of direct-to-consumer advertising.

and

H_{1b}: The average retail brand gross margin measured by percentage decreases after the initiation of direct-to-consumer advertising.

Advertised brands and the Top 120 brands.

The differences between retail margins observed before and after the initiation of direct-to-consumer advertising predicted by H_1 may be due to a secular trend in declining retail margins for all brands of prescription drugs. Chapter III described the domination of drug manufacturers in the channels of distribution, and this power may be translated into decreased retail margins for all branded drug products. The next hypothesis will determine whether the decrease in the gross retail margins for the advertised brands predicted by the first hypothesis occurred with changes in gross retail margins for other brands:

Research hypothesis two:

The average retail brand gross margin for advertised brands decreases relative to the average retail brand gross margin for other (unadvertised) brands.

H_{2a}: After the initiation of direct-to-consumer advertising, the average retail margins of advertised brands measured in dollars are lower than the average retail margins for other

(unadvertised) brands in the Top 120.

H_{2b}: After the initiation of direct-to-consumer advertising, the average retail margins measured by percentages for advertised brands are lower than the gross retail margins for other (unadvertised) brands in the Top 120.

Advertised brands and same-category brands.

Over time, the individual product categories for prescription drugs may undergo changes in retail margins which are related to category-specific factors. In testing these hypotheses, we are controlling for the possibility that the predicted decreases in retail margins observed from the first hypothesis tests are associated with changes in retail margins for the advertised brand's therapeutic class:

Research hypothesis three:

After the initiation of direct-to-consumer advertising, the average brand gross retail margins for advertised brands decrease relative to the average brand gross retail margins for other (unadvertised) brands within the same therapeutic class.

H_{3a}: After direct-to-consumer advertising, the average retail margins for advertised brands measured in dollars are lower than the average retail margins for other (unadvertised) brands within the same therapeutic class.

H_{3b}: After direct-to-consumer advertising, the average gross retail margins for advertised brands measured by percentages are lower than the average gross retail margins for other (unadvertised) brands.

DESCRIPTION OF DATA AND VARIABLES

DESCRIPTION OF DATA

Wholesale Prices

Medi-Span publishes the Prescription Pricing Guide (PPG), which lists average wholesale prices (AWP) for all brands of prescription drugs. Medi-Span determines the AWP by either 1) listing the manufacturer's suggested wholesale price to the retailer or 2) listing the common wholesale selling price to the retailer as determined by a survey among wholesalers across the United States. In its price lists, Medi-Span makes no distinction in the prices reported between these two methods.

This "average" price is not a mathematical average, but rather a system whereby the most frequently used price, or the mode, is considered the norm. If the manufacturer's suggested retail price is suspect, Medi-Span will check with the manufacturer to establish the actual wholesale price. Medi-Span reports that "in several instances... (MediSpan has) advised manufacturers when severe discrepancies have occurred between the Suggested Wholesale Price and the actual wholesaler selling price."[1] The price lists from the wholesalers are then "post hoc," since the prices reported are more the "actual" price than the "suggested" price. This may be a drawback for retailers who wish to find out if the wholesale prices which they are paying are "fair," but for the purposes of this research, the AWP is closer to the actual transaction price and is more reliable for purposes of this analysis.

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[1]Source: "Medi-Span's Editorial Policy for Determining AWP and DP Prices," internal document, Medi-Span, Inc., Indianapolis, Indiana, 1990.

Retail Prices

Medi-Span also publishes the Rx Competitive Pricing Guide (RxCPG), which provides retail prices for the 120 top-selling prescription drugs. These prices are acquired by Medi-Span through surveys to pharmacies throughout the United States. The RxCPG provides the retail prices for both the test and control groups.

DESCRIPTION OF VARIABLES

Independent Variables

The primary independent variables in this study are categorical measures of the presence or absence of direct to consumer advertising. Because direct-to-consumer advertising is relatively new within the drug industry, data for dollar expenditures were not available for all direct-to-consumer-advertised brands. For this reason, a dummy variables are used as independent variables in the approach discussed below. The dummy variable will represent the starting point for the direct-to-consumer advertising for each brand in the test group. Because relatively few of the brands in each therapeutic class actually participate in the practice, it has been newsworthy in the popular and trade press when a manufacturer begins an advertising campaign.

Dummy variables are also used to compare differences in retail margins between advertised and unadvertised brands in the various time periods. These categorical variables are further discussed below.

Dependent Variables

The dependent variables in this study are dollar and percentage gross retail margins for the brands measured in 1986 dollars (in order to control for inflation) derived from the average wholesale prices and average retail prices for prescription drugs in each year. Data on a brand-level basis have been obtained from Medi-span, Inc., a company which provides software to retail pharmacies and also publishes several listings of average wholesale, retail, and hospital pharmacy prices on a monthly basis.

The three research hypotheses test the differences in per unit gross retail margins measured in dollars and per unit gross retail margins measured by percentage for the brands within each group before and after direct-to-consumer advertising. As Albion (1983) and Steiner (1978b, 1984, 1991a) have pointed out, the gross margin for a brand can be a valuable means of determining the intensity of competition among retailers. Previous studies have employed two measures of retail brand gross margins, and both of these measures will be used in the present study. First, Liebermann and Ayal (1985) used gross margins measured in dollars, which are simply the brand's retail price less the brand's wholesale price. Albion (1983) used retail margins measured by percentage, which is the dollar gross retail margin divided by the average retail price for each brand. Research within the pharmaceutical industry has also employed both measures of retail margins (e.g., Thomas and Schondelmeyer 1992).

Therapeutic Classes

The product markets for each brand used to test H_3 are defined in terms of that product's "therapeutic category," or therapeutic class. The therapeutic class system is similar to the Standard Industrial Classification system in that the classes are used as a means of delineating different product categories. The therapeutic class concept classifies products on a combination of factors: chemical structure, dosage forms, pharmacological effect, and the perceived use in the treatment of disease. The therapeutic classification system has been used extensively in pharmacoeconomic research (see the studies cited in Chapter III).

RESEARCH DESIGN

The design will allow comparisons of retail margins for groups of advertised and unadvertised brands of prescription drugs before and after the initiation of direct-to-consumer advertising. Any differences in retail margins between the groups will then be analyzed for statistical significance.

All price data were selected from the time period between and including June 1986 and July 1992, during which some brands began advertising directly to consumers. The group of brands which began advertising at some point in the time horizon comprised a very large percentage of the direct-to-consumer-advertised brands, but there are some limitations to this specification. For some of the brands of drugs, direct-to-consumer advertising was initiated only in the last two time periods, so an

extensive number of observations "after" the treatment of advertising is not available. Nonetheless, the brands of drugs included in the Top 120 "market basket" which are used as a basis of comparison will also include new brands and are assumed to represent general trends in prices and margins.

For H_1, the dollar and percentage retail margins of the advertised brands before advertising (control group) will be compared to those retail margins after the initiation of direct-to-consumer advertising (test group). While the test group in this study is considered a small sample for statistical analysis (there are thirteen brands or brand families which began advertising within the time horizon), the sample represents a very large proportion of the population of advertised brands.

For H_2, the retail margins of the advertised brands will be compared to the retail margins for the remaining unadvertised brands in the Top 120. The test group used for the second set of hypotheses (H_{2a}, H_{2b}) are the retail margins measured in dollars and by percentages for the brands which began advertising at some point within the time horizon. To test H_2, we wish to compare the average retail margins between the advertised and unadvertised brands to find out if there were differences between the retail margins before and after the initiation of direct-to-consumer advertising.

The test group used for testing H_3 will again be the retail margins of the advertised brands. The control group in this study will be

comprised of brands in the same therapeutic classes which did not advertise directly to consumers within the time horizon. The purpose of the control group in this case is to establish some overall trend in same-category retail margins for the specified time period as a basis for comparison.

ANALYSIS APPROACH

Gross Retail Margins

The hypotheses are intended to test the differences between average retail margins of advertised and unadvertised brands of prescription drugs. The analysis employed to test these hypotheses is a regression which uses the dollar and percentage retail margins of each brand at subsequent points in time as dependent variables. The regression model which is used to estimate the data for the H_1 is:

$$MAR \text{ (or } PMAR) = B + START$$

The constant term provides the dollar margin (MAR) or percentage margin (PMAR) measurement for each brand, and will serve as the means of comparison used to evaluate the differences in means before and after the initiation of direct-to-consumer advertising. The categorical independent variable for the first hypothesis, as described above, is a dummy variable which indicates the presence or absence of direct-to-consumer advertising:

START = 1 in the time periods after the brand is advertised directly to consumers
0 in the time periods before the brand is advertised directly to consumers

The initial research hypothesis, H_1, may be expressed as

$$H_1: B_{START=1} < B_{START=0}$$

where

$B_{START=0}$ = average margin for the advertised brands before direct-to-consumer advertising

$B_{START=1}$ = average margin for the advertised brands after direct-to-consumer advertising

The null is stated as:

$$H_{o1}: B_{START=1} \geq B_{START=0}$$

Fitting each regression by ordinary least squares (OLS) will allow comparison of the residual sums of squares for each group so that the appropriate statistical test for significance (F-statistic) may be applied.

The second hypothesis is intended to account for the possibility that retail margins for all brands within the Top 120 may decrease together. The model to be tested for this hypothesis is:

$$MAR \text{ (or } PMAR) = B + PREAD + START + ADSTART$$

In addition to the START variable, the test of this hypothesis will include two other categorical variables to distinguish between the time periods before and after direct-to-consumer advertising. For the advertised brands:

PREAD = 1 in the time periods prior to direct-to-consumer advertising
0 in the time periods after direct-to-consumer advertising is initiated

The PREAD variable allows the comparison of margins of the group of advertised brands to the margins of the Top 120 brands in the time periods prior to the initiation of direct-to-consumer advertising.

The test of this hypothesis also includes a categorical variable which is applied to the unadvertised brands. ADSTART will denote the time periods <u>after which</u> the advertised brands began advertising, and will allow a comparison of retail margins and price changes for the unadvertised brands in the time periods after direct-to-consumer advertising. For the unadvertised brands:

ADSTART = 0 in the time periods prior to direct-to-consumer advertising
1 in the time periods following direct-to-consumer advertising

The research hypothesis can be expressed as

$$H_2: B_{START=1} < B_{ADSTART=1}$$

where $B_{START=1}$ = retail margins for the advertised brands after direct-to-consumer advertising

$B_{ADSTART=1}$ = retail margins for the unadvertised brands in the time periods after the initiation of direct-to-consumer advertising

The null is stated as:

$$H_{o2}: B_{START=1} \geq B_{ADSTART=1}$$

The third set of hypotheses is intended to show differences in retail margins between direct-to-consumer-advertised and unadvertised brands within the same therapeutic classes after the initiation of direct-to-

consumer advertising. The test of these hypotheses will employ the same linear model as H2 above, so that the regression equation is:

$$MAR \text{ (or } PMAR) = B + PREAD + START + ADSTART$$

The variables employed are identical to those used in the previous hypothesis test; the sample group, however, consists of those brands within the same therapeutic classes as those brands which are advertised.

The third research hypothesis can be expressed as

$$H_3: \quad B_{START=1} < B_{ADSTART=1}$$

where $B_{START=1}$ = retail margins for the direct-to-consumer-advertised brands

$B_{ADSTART=1}$ = retail margins for the (unadvertised) brands within the same therapeutic classes

The null is stated as:

$$H_{o3}: \quad B_{START=1} \geq B_{ADSTART=1}$$

The next chapter first provides the description and analysis of the margin and pricing data and then proceeds with the statistical testing of these hypotheses.

CHAPTER V

DATA ANALYSIS AND HYPOTHESIS TESTING

This chapter first provides an analysis of the pricing data and then provides the statistical testing of the hypotheses. The first section 1) describes the levels of prices at the wholesale and retail levels over the time horizon and 2) describes the retail gross margins for advertised and unadvertised brands over the time horizon. The second section tests the hypotheses developed in the previous chapter.

PRICE LEVELS

RETAIL PRICES

Figure 5-1 shows the average retail prices per unit for those brands in the Top 120 which were never advertised, and average retail prices per unit for those brands which began advertising at some time during the time horizon from 1986 to 1992. Retail prices appear to have increased consistently over the time horizon.

WHOLESALE PRICES

Figure 5-2 shows the average wholesale prices for the Top 120 and for those brands which initiated direct-to-consumer advertising at some time during the 1986-1992 time horizon. Again, it appears that the average wholesale price per unit increased consistently over the time horizon.

Figure 5-1: Average retail prices (adjusted to 1986 dollars)

Top 120 and advertised brands

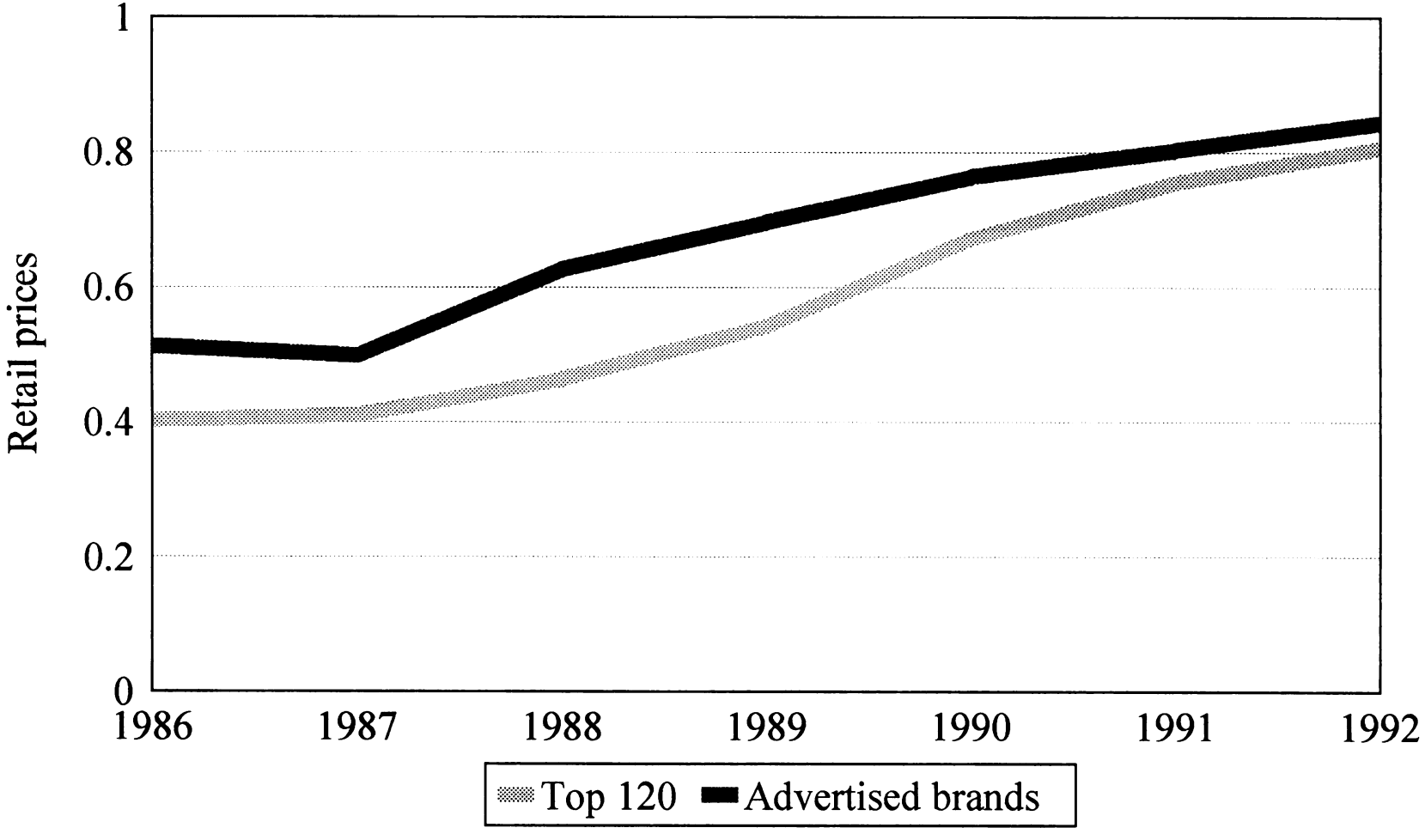
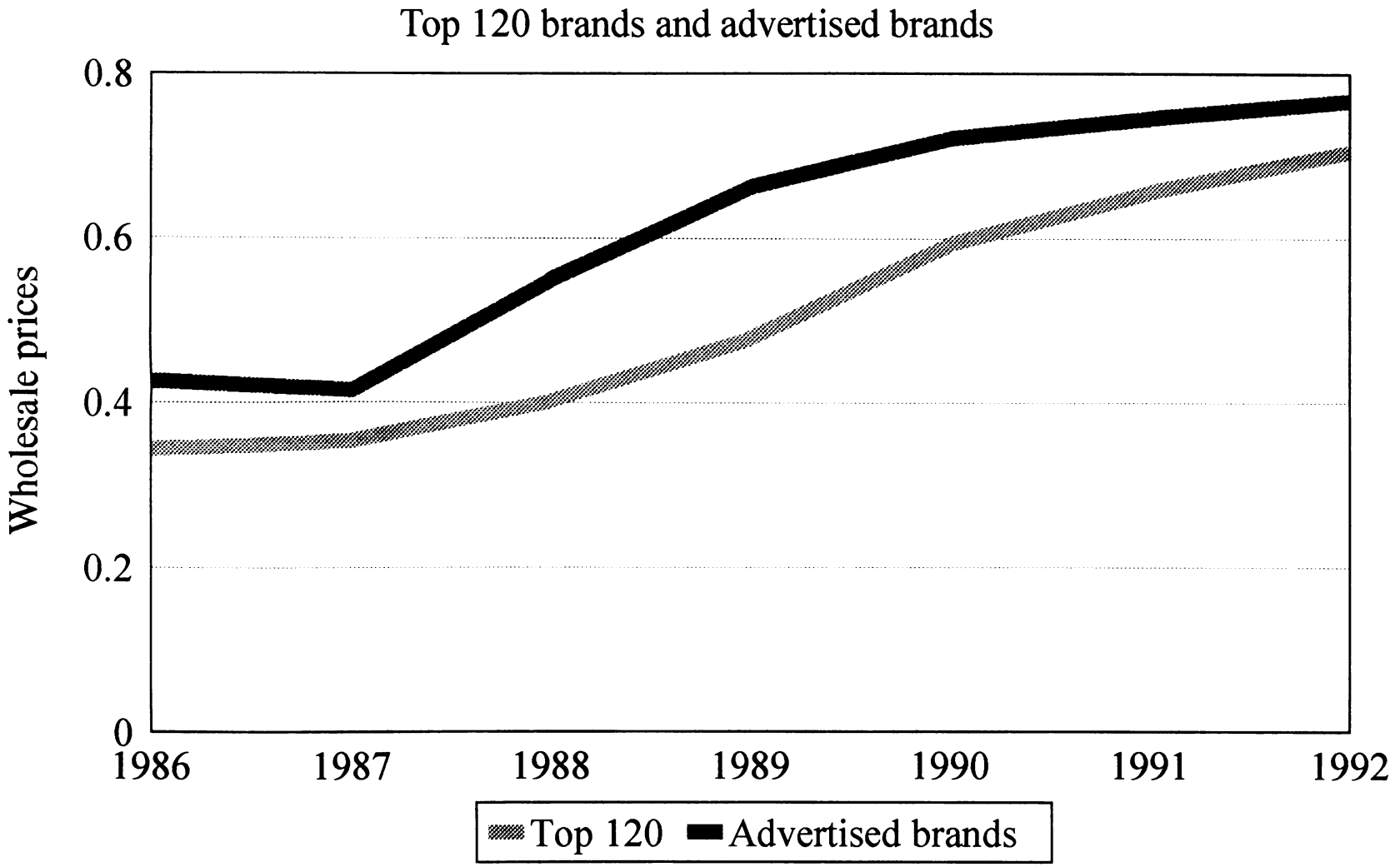


Figure 5-2: Wholesale prices (adjusted to 1986 dollars)



RETAIL BRAND GROSS MARGINS

MARGINS MEASURED IN DOLLARS

Figure 5-3 shows the average retail margins measured in dollars (calculated as the difference between the retail and wholesale price) for the Top 120 brands and for the direct-to-consumer advertised brands over the six-year time horizon. Dollar margins for the advertised brands appear to have declined in 1989 and then gradually began to increase, although the per-unit margins for the advertised brands appear to remain lower than those margins for the Top 120 (unadvertised) brands. Tests of hypotheses later in this chapter will attempt to determine whether these observed differences are statistically significant.

MARGINS MEASURED BY PERCENTAGE

Figure 5-4 shows the average retail margins measured by percentage for the Top 120 brands and for the direct-to-consumer advertised brands over the six-year time horizon. From this Figure, it appears that percentage margins from 1986 to 1992 remained roughly stable for the Top 120 brands, while the percentage margins for the advertised brands appear to have decreased. Tests for the statistical significance of these observations are reported later in this chapter.

Figure 5-3: Dollar Gross Margins (adjusted)

Top 120 and Advertised brands

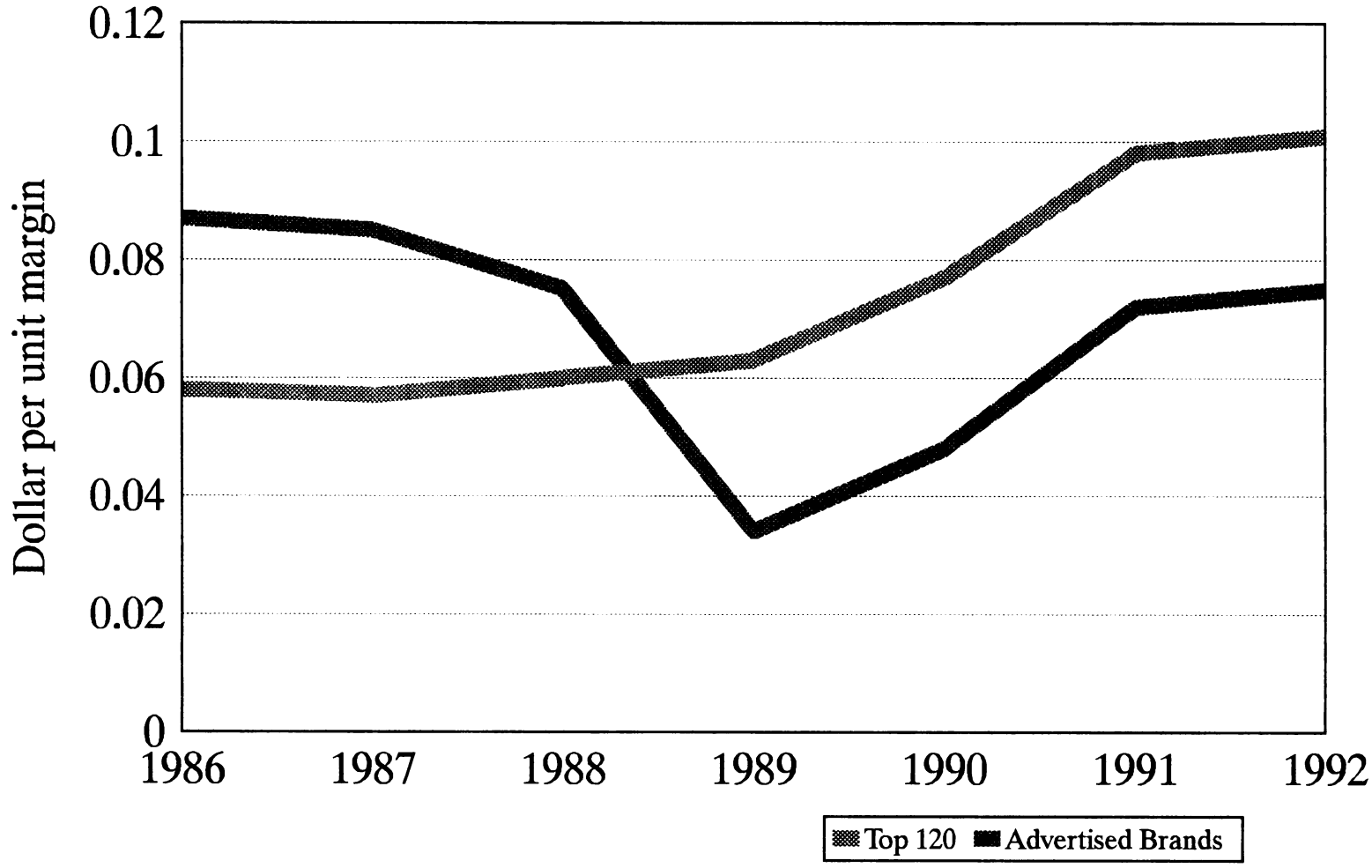
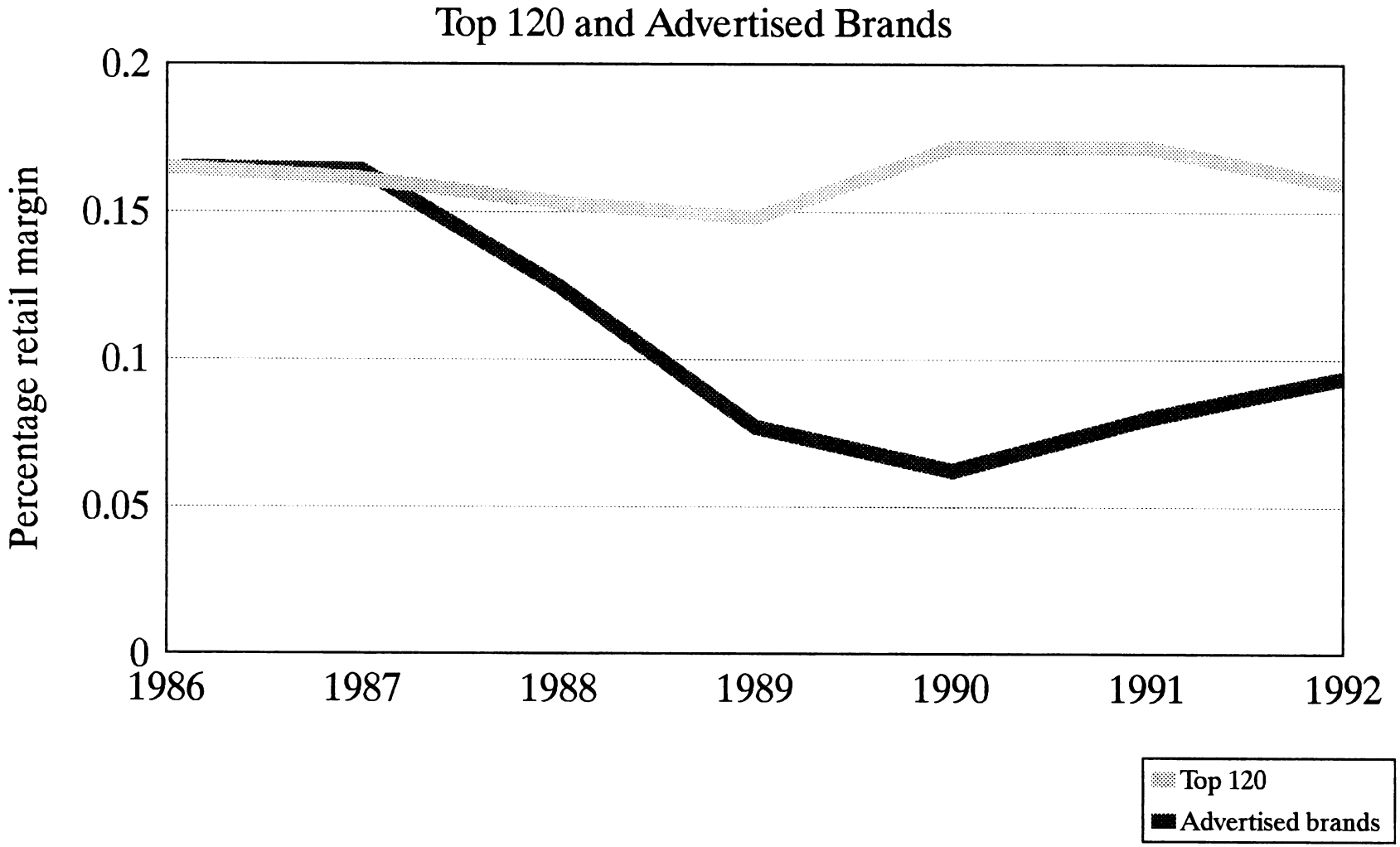


Figure 5-4: Gross Percentage Margins (using adjusted prices)



STATISTICAL HYPOTHESIS TESTING

In this section, each of the hypotheses developed in the previous chapter is discussed in turn, and support for each hypothesis is presented.

ADVERTISED BRANDS BEFORE AND AFTER DIRECT-TO-CONSUMER ADVERTISING

The first set of hypotheses are intended to describe the behavior of retail gross margins of the subset of brands which began direct-to-consumer advertising at some point between 1986 and 1992. A total of 13 brands were used to determine the average dollar and percentage margins before and after direct-to-consumer advertising for a total of 100 observations.

H_{1a}: The average retail brand gross margin measured in dollars decreased after the initiation of direct-to-consumer advertising.

The linear model used to test the data is

$$MAR = .083 - .041\ START \quad (p = .033)$$

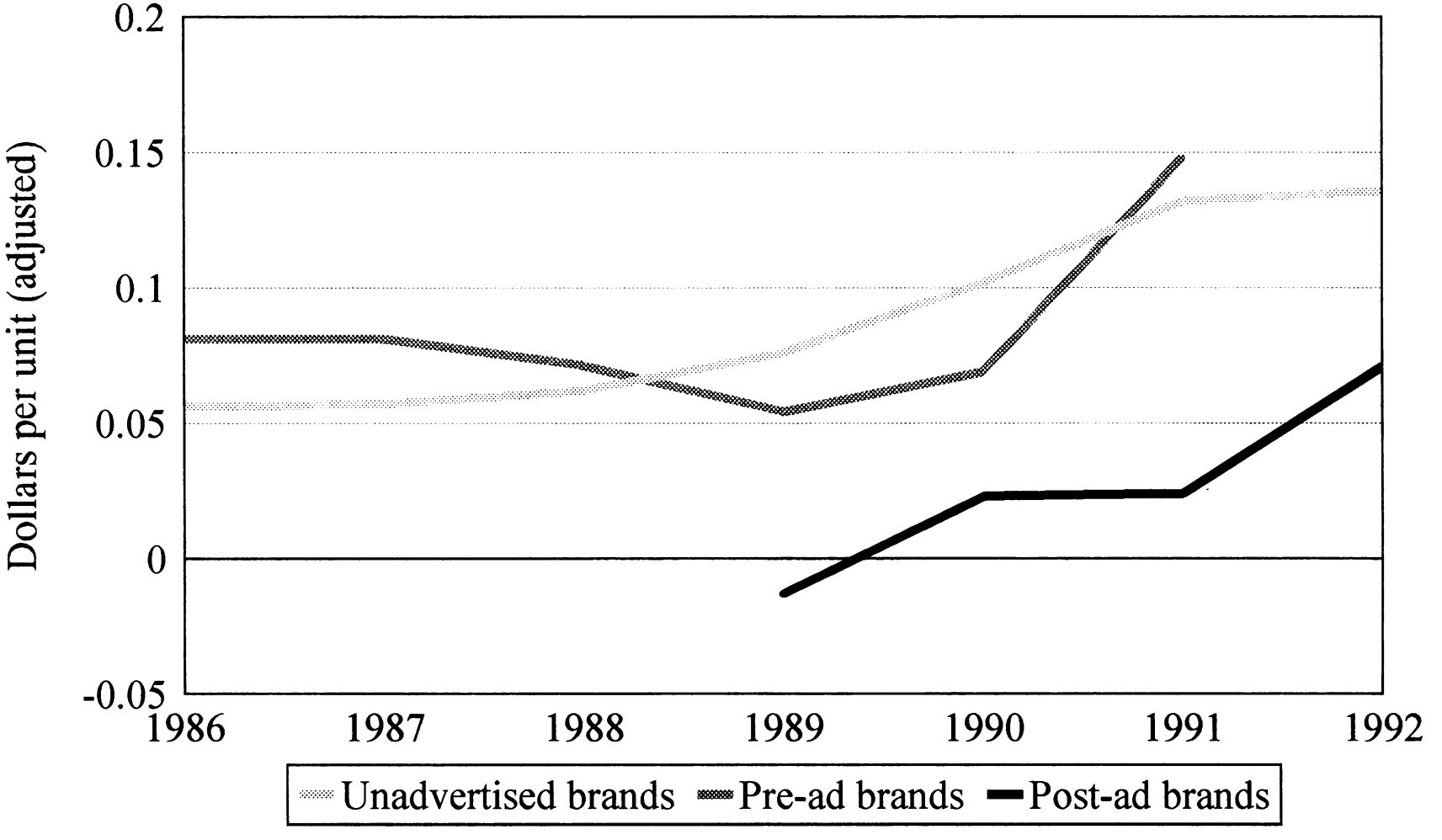
The analysis of variance results are shown in Table 5-1. The gross retail margins measured in dollars for the advertised brands decreased from an average of $.083 per unit before advertising to $.042 per unit after advertising, which is significant at the p (two-tailed) = .033 level, although the variance explained by this equation is only 4.5%. A graphical depiction of these results is provided in Figure 5-5.

Table 5-1: ANOVA Results for Dollar and Percentage Margins
Advertised Brands Only

Source of Variance	Value of Coefficient	Sum-of-Squares	DF	Mean-Square	F-Ratio	P (one-tail)
Dollar Margins:						
Constant	0.083					
START	-0.041	0.042	1	0.042	4.653	0.0165
Error		0.882	98	0.009		
$R^2 = .045$						
Percentage Margins:						
Constant	0.139					
START	-0.078	0.154	1	0.154	18.936	0.00
Error		0.794	98	0.008		
$R^2 = .142$						

Figure 5-5: Dollar Gross Margins

Unadvertised brands, pre/post advertised brands



H_{1b}: The average retail brand gross margin measured by percentage decreased after the initiation of direct-to-consumer advertising.

The linear model derived from the data is

$$PMAR = .139 - .078\ START \quad (p = .000)$$

The ANOVA results are also shown in Table 5-1. The gross retail margin measured in percentage terms for the advertised brands in the periods before direct-to-consumer advertising was 13.9%; following the initiation of advertising this percentage margin decreased to 6.1%. This difference is significant at the p (one-tailed) = 0.000 level, and explains 16.2% of the variance. A graphical depiction of these results is shown in Figure 5-6.

ADVERTISED BRANDS AND THE TOP 120 BRANDS

The second research hypothesis is intended to determine whether gross retail margins for advertised brands decreased relative to all brands in the Top 120:

H_{2a}: After the initiation of direct-to-consumer advertising, the average retail margin of advertised brands measured in dollars are lower than the average retail margin for other (unadvertised) brands in the Top 120.

The linear model derived from the data is

$$MAR = .057 + .012\ PREAD - .061\ START + .034\ ADSTART \quad (p = .245) \quad (p = .000) \quad (p = .000)$$

Figure 5-6: Percentage gross retail margins
(based on adjusted prices)

Unadvertised brands, pre- and post-advertised brands

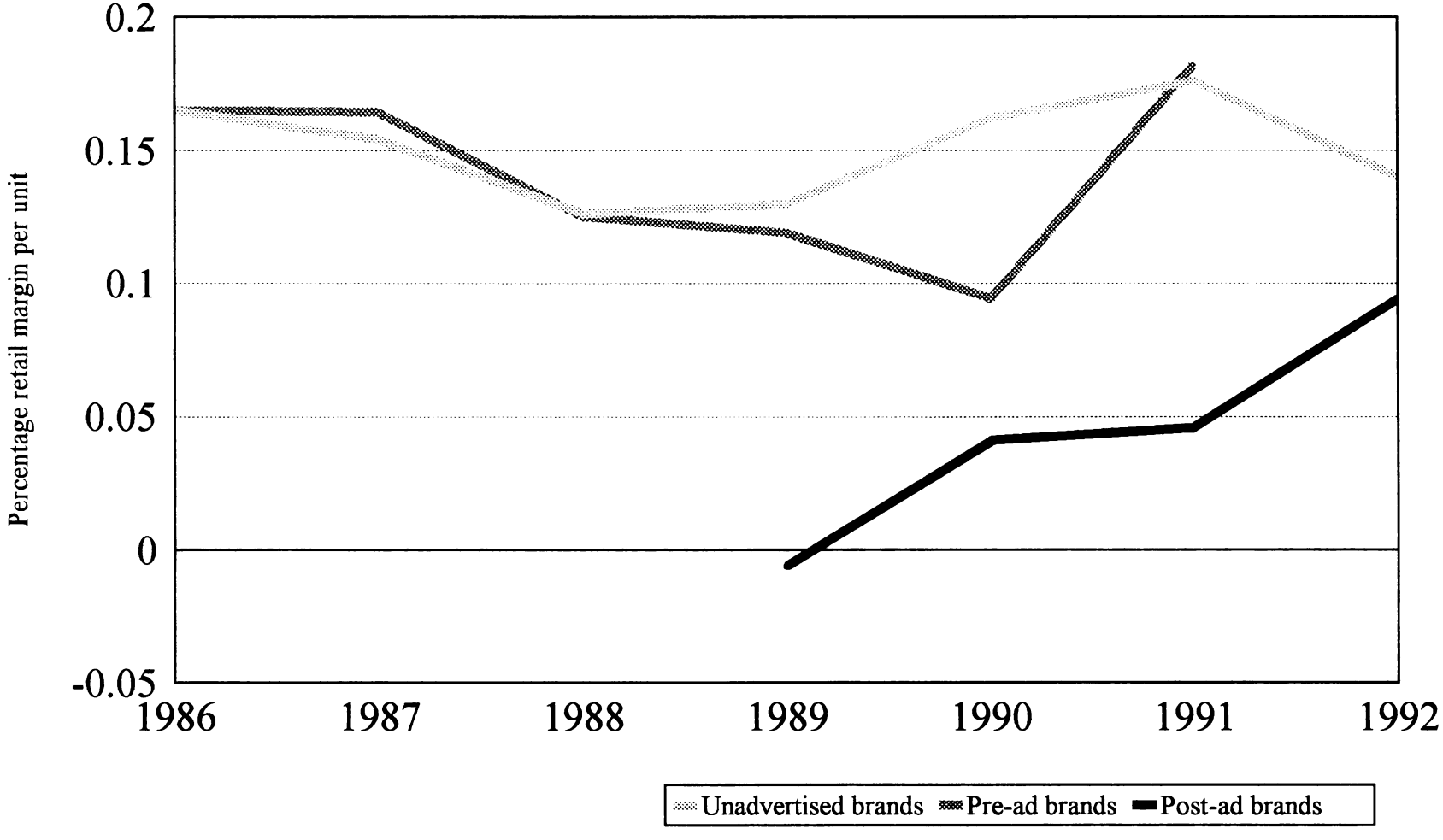


Table 5-2: ANOVA Results for Dollar and Percentage Margins
Top 120 and advertised brands

Source of variance	Value of coefficient	Sum-of-Squares	DF	Mean-Square	F-ratio	p (one-tail)
For dollar margins:						
Constant	0.057					
PREAD	0.012	0.007	1	0.007	1.351	0.123
START	-0.049	0.107	1	0.089	20.86	0.000
ADSTART	0.034	0.205	1	0.205	40.164	0.000
Error		3.873	757	0.005		
R^2=.063						
For Percentage Margins:						
Constant	0.161					
PREAD	-0.021	0.019	1	0.019	1.665	0.093
START	-0.098	0.426	1	0.426	36.627	0.000
ADSTART	-0.003	0.001	1	0.098	0.098	0.000
Error		8.801	757	0.012		
R^2=.051						

The analysis of variance results are shown in Table 5-2. These results support the hypothesis and suggest that after the initiation of direct-to-consumer advertising, the average retail margins measured in dollars for advertised brands declined significantly relative to those retail margins measured in dollars for brands in the Top 120. The PREAD variable, which measures the margins of the advertised brands prior to the initiation of direct-to-consumer advertising in that group, suggests that dollar gross retail margins for the advertised brands were not significantly different from those for the unadvertised brands. However, as dollar retail margins increased for the unadvertised brands (ADSTART is positive and significant), the initiation of direct-to-consumer advertising is associated with a decline dollar retail margins for the advertised brands.

H_{2b}: After the initiation of direct-to-consumer advertising, the average retail margins measured by percentages for advertised brands are lower than the gross retail margins for other (unadvertised) brands in the Top 120.

The linear model derived from this test is

$$\underset{}{\text{PMAR}} = \underset{}{.161} - \underset{(p = .197)}{.021}\ \text{PREAD} - \underset{(p = .001)}{.077}\ \text{START} + \underset{(p = 0.754)}{0.003}\ \text{ADSTART}$$

The analysis of variance results are also shown in Table 5-2. This test supports the hypothesis, since the percentage gross retail margins are significantly different from the unadvertised brands in the time periods after the initiation of direct-to-consumer advertising. In the periods prior to direct-to-consumer advertising, average retail margins for the

advertised brands are not significantly different from those for the unadvertised brands. Percentage retail margins in the ADSTART time periods for unadvertised brands were not significantly different from the margins measured by PREAD in the earlier time periods.

ADVERTISED BRANDS AND SAME-CATEGORY BRANDS

The following hypotheses are intended to determine whether changes observed in gross retail margins for the advertised brands observed in H_1 are accounted for by changes in margins for a brand's entire therapeutic class.

> H_{3a}: After direct-to-consumer advertising, the average retail margins for advertised brands measured in dollars are lower than the average retail margins for other (unadvertised) brands within the same therapeutic class.

The linear model derived from the data is

$$\underset{\text{(p = .184)}}{\text{MAR} = .055 + .016\ \text{PREAD}} \underset{\text{(p = .000)}}{- .058\ \text{START}} \underset{\text{(p = .003)}}{+ .029\ \text{ADSTART}}$$

The analysis of variance results are shown in Table 5-3. These results support the hypothesis and suggest that the retail margins measured in dollars for advertised brands declined significantly relative to unadvertised brands in the same therapeutic class. The PREAD variable suggests that prior to the initiation of direct-to-consumer advertising, there was not a significant difference in gross retail margins measured in dollars between the advertised brands and the unadvertised brands.

Table 5-3: ANOVA Results for Dollar and Percentage Margins

Same-category brands

Source of Variance	Value of Coefficient	Sum-of-Squares	DF	Mean-Square	F-Ratio	P (one-tail)
For Dollar Margins:						
Constant	0.055					
PREAD	0.016	0.01	1	0.01	1.775	0.092
START	-0.042	0.066	1	0.066	11.73	0.000
ADSTART	0.029	0.05	1	0.05	8.958	0.002
Error		1.638	293	0.006		
R^2= .058						
For Percentage Margins:						
Constant	0.155					
PREAD	-0.014	0.008	1	1.063	1.603	0.399
START	-0.091	0.305	1	41.588	41.588	0.000
ADSTART	-0.003	0.001	1	0.001	0.073	0.152
Error		2.147	293	0.007		
R^2= 0.138						

The ADSTART variable suggests that dollar retail margins increased for the unadvertised brands in the later time periods.

H_{3b}: After direct-to-consumer advertising, the average gross retail margins for advertised brands measured by percentages are lower than the average gross retail margins for other (unadvertised) brands within the same therapeutic class.

The linear model derived from this test is

$$PMAR = .155 - .014\ PREAD - .077\ START - .003\ ADSTART$$
$$(p = .788) \quad (p = .000) \quad (p = .303)$$

The analysis of variance results are also shown in Table 5-3. This test supports the hypothesis, since the percentage gross retail margins are significantly different from the unadvertised brands after the initiation of direct-to-consumer advertising. In the time periods prior to direct-to-consumer advertising, the percentage margins are not significantly different between the advertised and unadvertised brands.

The next chapter will discuss the results derived from this statistical analysis and provide discussion regarding directions for future research.

CHAPTER VI

DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

The final chapter begins with discussion and conclusions based on the hypothesis testing, then provides theoretical, managerial, and public policy implications of this research. The chapter concludes with a discussion of the limitations of the present study and recommendations for future research.

DISCUSSION OF HYPOTHESES

Chapter 2 provided discussion of literature which has provided evidence of general relationships between manufacturers' advertising and retail margins. Chapter 3 described the pharmaceutical industry from a vertical perspective. From those discussions, the following hypotheses were generated:

H_{1a}: The average retail brand gross margin measured in dollars decreases after the initiation of direct-to-consumer advertising.

H_{1b}: The average retail brand gross margin measured by percentage decreases after the initiation of direct-to-consumer advertising.

H_{2a}: After the initiation of direct-to-consumer advertising, the average retail margin of advertised brands measured in dollars are lower than

the average retail margin for other (unadvertised) brands in the Top 120.

H_{2b}: After the initiation of direct-to-consumer advertising, the average retail margins measured by percentages for advertised brands are lower than the gross retail margins for other (unadvertised) brands in the Top 120.

H_{3a}: After direct-to-consumer advertising, the average retail margins for advertised brands measured in dollars are lower than the average retail margins for other (unadvertised) brands within the same therapeutic class.

H_{3b}: After direct-to-consumer advertising, the average gross retail margins for advertised brands measured by percentages are lower than the average gross retail margins for other (unadvertised) brands within the same therapeutic class.

GROSS RETAIL MARGINS

The statistical hypotheses were developed to test for differences in retail margins measured in both dollar and percentage terms for the advertised brands.

H_1: Behavior of retail margins in advertised brands

Both of these hypotheses are supported by the data. Average gross margins measured in dollars appear to decrease in the time periods following the initiation of direct-to-consumer advertising. At the same time, while prices continued to increase (even controlling for generalized inflation), the gross margins measured by percentage which pharmacists applied to the advertised brands shrank significantly.

Given these two statistical tests, the differences in average per-unit margins which the retail pharmacist applied before the initiation of direct-to-consumer advertising were significantly greater than those received after the various manufacturers undertook "pull" tactics.

H_2: Comparison of retail margins with the Top 120 brands

The second pair of statistical hypotheses compare the retail margins of the advertised brands with those retail margins for the Top 120 brands. The test of H_{2a} suggests that there was not a significant difference between dollar margins for unadvertised brands and those for advertised brands prior to the initiation of direct-to-consumer advertising. The START coefficient is in the predicted direction and is significant at the .000 level. In the time periods after direct-to-consumer advertising, the dollar margins for the unadvertised brands were actually higher, so that there were significant differences in dollar margins between advertised and unadvertised brands.

The test of H_{2b} suggests that percentage margins for advertised brands were not significantly different from those for unadvertised brands in the time periods prior to direct-to-consumer advertising. Following the initiation of advertising the percentage margin for advertised brands decreased significantly relative to margins measured for the unadvertised brands. The ADSTART variable is shown to be not statistically significant, suggesting that retailers' percentage margins for the unadvertised brands were held constant across the time horizon.

H_3: Comparison of same-category retail margins

The decline in retail margins detected in H_1 does not appear to be related to therapeutic class. The test of H_{3a} suggests that in the time periods prior to direct-to-consumer advertising, dollar and percentage margins for the advertised brands were slightly higher, but not significantly different from other brands in the same therapeutic categories. The coefficient for the START dummy variable, which denotes the initiation of direct-to-consumer advertising, is significant at the $p = .000$ level, while the ADSTART coefficient indicates that dollar margins were significantly higher in the unadvertised group in the time periods after direct-to-consumer advertising was initiated in the other group.

Average margins of the advertised brands measured by percentage terms also appear to have declined relative to those percentage margins in unadvertised brands. H_{3b} shows that in the time periods prior to direct-to-consumer advertising, the percentage margins of the advertised brands were not significantly different from those of the unadvertised brands. As the percentage margins for unadvertised brands did not change (ADSTART is positive but not significant), the percentage margins for direct-to-consumer-advertised brands relatively declined.

The tests of these hypotheses strongly suggest that retail margins measured in dollars and by percentage for the advertised brands shrank after direct-to-consumer advertising and remained significantly lower than the margins of unadvertised brands. Given that before-advertising dollar margins for advertised brands were much higher than those for

unadvertised brands, and that before-advertising percentage margins for advertised brands were slightly higher than those for unadvertised brands, the results derived from these hypotheses appear to support the argument that the dual-stage relationships described in other product categories exist in the pharmaceutical industry. That is, the differentiation efforts of the manufacturers appear to have had the effect of driving down margins for retail pharmacists.

IMPLICATIONS

The preponderance of the evidence from this study provides support for the application of the dual-stage theory in the prescription drug industry, and that the differentiation efforts of manufacturers tend to be associated with decreased retail margins. This section will provide theoretical, managerial, and public policy implications of the research.

IMPLICATIONS FOR THEORY DEVELOPMENT

This application of the dual-stage theory has added evidence of the effects of manufacturers' advertising in a non-grocery product category. The results from this study may also be interpreted to suggest that there exists an important interdependence between a drug manufacturers' advertising and retail performance as measured by brand gross margins. This particular measure of retail performance has not been considered previously in the published literature dealing with the pharmaceutical industry. This provides an added dimension to previous theoretical studies which have considered only the manufacturers' level of the

channel of distribution in describing competitive relationships in the industry (U.S. Senate 1993; Grabowski and Vernon 1992; Maness and Wiggins 1992; Caves, Hurwitz and Whinston 1991). The observation that retail pharmacies make pricing decisions independent of cost but based on retail competition also provides another dimension to the previous theoretical assumptions of passive channel members in this industry (Comanor 1986; Porter 1974).

The dual-stage theory also represents an extension of previous marketing literature which deals with the effects of advertising on consumer price sensitivities (Kanetkar, Weinberg, and Weiss 1992; Krishnamurthi and Raj 1985; Wittink 1977). The decrease in interbrand price sensitivity of consumers as a result of manufacturers' advertising is implicit in the dual-stage theory, but points toward the importance of considering multiple levels of distribution when specifying marketing models. As suggested by previous researchers (e.g., Farris 1976; Albion 1983), brands which are less expensive at the manufacturing level may actually be relatively more expensive at the consumers' level. Analyses of the effects of advertising by manufacturers on price sensitivities should therefore consider this possibility.

IMPLICATIONS FOR INDUSTRY-LEVEL ANALYSIS

In general, this application of the dual-stage model suggests the potential for changing relationships among members of the pharmaceutical industry as a result of the strategic activities of one member. To be consistent with the dual-stage perspective, the implications to be drawn

from these results depend on which level of the distribution channel -- retailer, physician, or manufacturer -- is considered.

The retail pharmacist has been described in Chapter III as having limited power in the channel. However, because the retailer in this industry occupies an intermediary position among all participants in drug distribution, the pharmacists' substitution and pricing activities may affect all other members of the channel (LaRoche, et al. 1986; Pelton, Strutton, and Smith 1993).

On the one hand, evidence presented here suggests that retail pharmacies make pricing decisions based on retail competitive factors by applying different margins to different brands of drugs. At the same time, it would appear that the manufacturers' efforts to differentiate their products at the consumption end of the channel tend to reduce the retailers' power even further. Retailers are compelled to carry all brands of drugs, regardless of the manufacturers' prices, and therefore compete on the basis of their own price setting rather than drug product line.

Given other research presented in Chapter II, as well as the present analysis, it is safe to say that retail pharmacists may expect to have to set relatively lower prices for the advertised brands, or to curtail price increases because of increased retail competition for the more salient brands. The individual pharmacist may expect increased sales for those advertised brands as well, however Steiner (1973) and Albion

(1983) have provided evidence that retail margins are depressed even after controlling for turnover.

Other factors may squeeze these margins even more. Several studies have provided evidence that retail price advertising is associated with lower retail prices (Benham 1971; Glazer 1981). For example, certain states require pharmacies to post retail prices for many brands (New York State Code [1973], Article 137, Section 6826), and if manufacturers' direct-to-consumer advertising stimulates the demand for brands, this compulsory price posting might further increase retail competition, driving relative margins down even further (Cady 1975). This situation is not so different from grocery retailers, who advertise prices for salient brands to increase store traffic (Albion 1983). The potential interaction of manufacturers' brand advertising and retail price advertising merits more research in all product categories.

While turnover is exogenous to the present model, retailers may mitigate the effects of the margin-depressing effects of direct-to-consumer advertising by attempting to increase their own volume of sales. On a store-level basis, for example, this might mean advertising their lower prices for the manufacturer-advertised brands, emphasizing higher-margin generic substitution, or shifting to alternative non-drug product categories carried in their stores. While trade literature has suggested that "cherry-picking" consumers who shop from store to store for lower prices on prescriptions are not the primary target market (e.g., Seltzer 1986), retailers in competitive situations may not be able to ignore that segment, since the direct-to-consumer advertising

theoretically increases the salience of brands whose prices form the basis for store evaluation. The emphasis on prices may become even more important as different forms of retailers (e.g., neighborhood versus chain versus department store pharmacies) attempt to compete (Franzak 1992).

From the physicians' perspective, several studies have provided evidence that direct-to-consumer drug advertising does influence consumer behaviors. Potential consumers who are exposed to the advertising may recall the brands more readily ("Merrell Dow Talks..." 1987; "New prescription..." 1987), may ask or express intention to ask physicians about advertised brands (Everett 1991; Merrell Dow Talks..." 1987; "New prescription..." 1987; Perri and Nelson 1987; Perri and Dickson 1988; "Trends..." 1993), and may demand more of the advertised brands after effective advertising ("Physicians, Pharmacists..." 1984; Rosen 1982; Scott-Levin 1993). At least one group of physicians tended to believe that direct-to-consumer advertising would have some effect on the way that they practiced medicine (Cutrer 1989; Uzych 1993). The hypotheses tested in this study would tend to support the scenario under which physicians still hold considerable power in the channel in terms of product/brand selection, while manufacturers also wield a great deal of power in pulling consumers toward particular brands much like other "convenience" consumer products.

From a manufacturer's perspective, previous conclusions drawn from tests of the dual-stage theory (Farris 1981; Albion 1983; Albion and Farris 1987; Steiner 1993a) have suggested that advertisers should consider the

"downstream" effects of changes in their advertising budgets. In an industry persistently scrutinized for its pricing practices, it would seem particularly prudent for drug advertisers to consider these effects. The question in the case of pharmaceuticals, however, would not appear to be the relative size of the advertiser's budget, but rather the effectiveness of the marketing program. Certain drugs may have extremely well-defined consumer markets in terms of prescription and use, while other drugs may have very ambiguously defined markets (Krupka and Vener 1985). For example, a drug which is intended to treat gallstones is only prescribed for patients who indicate gallstone problems, while antidepressants or pain medications may be prescribed for a number of less defined, less measurable symptoms. In these less-defined markets, there is the potential for more switching among brands (Bird 1994; Montagne 1992), so that the promotional efforts of manufacturers may be more influential in discouraging switching to less advertised brands.

Drug companies have become specialists in targeting specific physician-directed journal advertising, but need to be particularly aware of the dynamics of target marketing to consumers, since the number market of consumers for a given brand of drug may be very small relative to market sizes of other consumer products.

IMPLICATIONS FOR PUBLIC POLICY DEVELOPMENT

The evidence presented here, within the context of other studies cited, can be interpreted to suggest that public policymakers must incorporate

a vertical perspective when considering the effects of manufacturers' promotional efforts. Albion (1983) has stated that

> ...(A)lthough advertised brands typically maintain a higher relative price than unadvertised brands in a product category, the critical issue...deals with advertising's relationship to the absolute market-price level for a product category, not to the relative brand retail prices. The existence of a significant impact of advertising on retail brand gross margins is essential evidence for the contention that advertising can lead to a reduction in absolute market prices (p. 253).

In the situation where a consumer may spend several thousand dollars per year on prescription drugs, these lower margins may translate into a considerable net benefit for the consumer. For example, if a brand of drug has sales of one billion dollars per year, and if the average retail margin without advertising was 15%, the net consumer savings after the manufacturer's advertising was initiated would be $75,000,000 if the retail margin were reduced by half. If and when drug manufacturers adopt direct-to-consumer advertising on a broader scale, the net savings at the consumer level brought on by increased competition at the retail level could amount to several hundreds of millions of dollars.

The studies undertaken by the Food and Drug Administration (e.g., Morris 1984) focused exclusively on prescription drug advertising content, and have not considered any of the potential economic effects which direct-to-consumer advertising may have in decreasing relative retail prices. While some policy-making agencies have considered dual-stage models (Lynch 1986; Masson and Steiner 1986), its impact on policy decisions is

unknown. Therefore, when public policy makers consider regulating manufacturers' advertising in the pharmaceutical industry, these effects should be considered in conjunction with informational issues.

At the same time, however, while manufacturers' advertising may induce lower retail prices by reducing lower brand gross margin, this same advertising may act as a barrier to entry for unadvertised brands, since the higher relative manufacturers' prices might suggest higher manufacturers' gross margins (Albion 1983). This would allow the manufacturers which advertise to be relatively more profitable. A "substantial, absolute" barrier to entry in the form of cost efficiency then may exist. Many of the industrial organization studies discussed in Chapter II have provided evidence that higher levels of manufacturers' advertising are associated with higher levels of profitability. For example, in a direct test of the dual-stage theory, Liebermann and Ayal (1988) presented evidence of increasing manufacturer's margins over time as a result of the manufacturer's advertising. Indeed, in the case of prescription drugs where "first mover" advantages seem to dictate much of the competition among manufacturers (Gorecki 1986; Maness and Wiggins 1992; Statman and Tyebjee 1981), the higher relative profitability of advertised brands may slow the development or marketing of growth of generic or unadvertised substitutes.

The implication may be that the effects of direct-to-consumer advertising, if initiated on a large scale across a number of therapeutic classes, may have more profound effects as a barrier to

entry when considering the vertical perspective of the industry (Albion 1983; Steiner 1991a). Hornbrook (1978) provided evidence which suggested that promotional expenditures by manufacturers was not associated with stability in market share in the pharmaceutical industry, but that study employed with-channel promotions rather than those directed toward consumers. While the consumer-directed promotions of manufacturers may have the effect of increasing intrabrand competition, in that retail pharmacists compete with one another through lower prices for the advertised brands, another effect is that of decreased interbrand competition, in that consumers are potentially less likely to seek substitutes for the advertised brands from either physicians or pharmacists.

LIMITATIONS

One of the limitations of this study is the relatively small sample size used for the "advertised brands" group. This small sample in conjunction with the apparent price escalation in response to the Pryor Act of 1990 may have distorted the results dealing with proportional price changes. However, it is important to point out that while the advertised brands comprise a small percentage of the Top 120 brands (and therefore an even smaller percentage of the population of all drugs), the test group represents a very large percentage of the population of advertised brands.

The possibility also exists that the significant changes in profit margins related to relative increases in wholesale prices may be due to

"bigger picture" strategies on the part of the individual manufacturers. That is, the initiation of direct-to-consumer advertising may be only a single manifestation of an overall marketing program. The inclusion of other variables, such as increased medical journal advertising by manufacturers or programs on the part of wholesalers (Anders 1993), may influence retail and/or wholesale prices. Some data for journal advertising expenditures are available, but appears to be unreliable (much like the data for advertising expenditures available through Leading National Advertisers). Measurement of increased activity by detail people is also unreliable on a per-brand basis, and the firms which collect most of the marketing data are somewhat uncooperative in providing these data for various reasons. However, intra-channel non-price promotions -- directed toward physicians and pharmacists -- should result in less price sensitivity for brands and possibly higher wholesale prices. It is also possible, however, that increased intra-channel promotions on the part of substitute brands might increase physicians' and pharmacists' awareness of more brands, increasing the potential for substitution and increasing the potential for price competition within channels. At any rate, the promotion directed to members of the channel are considered part of the total differentiation effort by the manufacturer, and the margin-depressing effects would likewise be predicted by the theory.

This study has also employed the use of categorical variables to measure direct-to-consumer advertising in the various time periods. Even though there is some difficulty in capturing the complexity of the behavior of retail margins and prices in a dichotomous variable, the results suggest

that the mere presence of direct-to-consumer advertising has a margin-depressing effect. However, the present study cannot specify relationships between advertising intensity in terms of dollars spent or consumers reached.

Given these limitations, the study has provided statistically significant evidence of depressed retail margins for a small group of pharmaceutical products. This decline in margins coincides with the inauguration of direct-to-consumer advertising for these brands; otherwise, the retail margins for advertised brands appear to be unrelated. Like the other studies discussed in Chapter II, this research effort was not able to include intra-channel promotional tactics. Brand manufacturers who implement an overall marketing program designed to increase sales may implement promotions at various levels in the distribution channel and decrease prices or offer quantity discounts, which could produce some of the same effects depicted here. While these constructs could not be included endogenously in the present analysis, as discussed in Chapter IV, the measurement of wholesale prices by MediSpan is considered reliable.

RECOMMENDATIONS

The implications and limitations of the present study provide the basis for the recommendations. This section will provide recommendations for the incorporation of these results into managerial practice and public policy decisions, and will suggest directions further research.

RECOMMENDATIONS FOR MANAGERIAL DECISION-MAKING

Albion (1983) and Albion and Farris (1987) have suggested that knowledge of the effects of brand advertising on retail margins would be useful to brand advertisers in establishing an advertising budget. Discussion in Chapter II suggested that the direct effects of manufacturers' advertising in other consumer goods industries may stimulate demand, while the indirect effects of the advertising may stimulate demand even further, through the relatively lower retail prices created by increasing the number of retail competitors. Albion and Farris (1987) have suggested that it may not be possible for brand marketers to change advertising expenditures without expecting subsequent longer-term changes in either wholesale or retail prices.

However, the increase in retail competition is created in part by the stimulation of retail penetration. In the case of prescription drugs, retail penetration is not a factor as it has been measured in previous research, nor would a decrease in retail prices necessarily increase the demand for some brands of drugs (e.g., a healthy person would be unlikely to seek out gallstone medication even if the price were zero).

Further, implicit in the conclusions of Farris and Albion has been the assumption that manufacturers' advertising is consistently effective, in that those authors have considered only the magnitude of a manufacturer's advertising expenditures (relative to competitors -- Albion 1983). In the case of prescription drugs (or other consumer products, for that matter), a reduction in advertising budget might

actually mean an increase in the effectiveness of the advertising if it were better targeted. Therefore, the margin-reducing effects of manufacturers' advertising may be more pronounced in smaller-market brands of drugs.

RECOMMENDATIONS FOR PUBLIC POLICY

Among the explicit objectives for policy makers in the area of pharmaceuticals for the last eighty years have been 1) ensurance of safety and efficacy in the prescription, manufacture, dispensing and use of drugs and 2) encouragement of competition presumably to decrease price. As discussed earlier, the FDA has had a difficult time in establishing exactly what is safe or unsafe about direct-to-consumer advertising, and has therefore provided little in the way of direct guidance for drug advertisers. The message content of direct-to-consumer advertising is obviously important in the distribution and safe use of pharmaceutical products. At the same time, however, the competitive aspects of direct-to-consumer advertising should also be considered.

Regulations which have attempted to satisfy the second objective have tended toward stimulating generic competition. As a case in point, both the Cellar Kefauver Amendments of 1962 and the Drug Act of 1984 were intended to increase the prescribing and usage of generic drugs and encourage lower overall prices for drugs by facilitating an increase in the number of competitors in a given product category. It would appear from the results presented here that marketing efforts of the drug manufacturers encourage relatively lower consumer prices as well <u>in</u>

situations where there may be no generic substitutes, and these efforts should therefore be considered in any cost-benefit analysis undertaken by policy makers. It should be noted that, given that generic drugs are of equivalent "utility" in that they are acceptable substitutes for branded drugs, if direct-to-consumer messages increase the primary demand for a treatment category, it is logical to expect an overall increase in generic consumption, particularly as patents for "blockbuster" drugs expire.

At the same time, however, this form of promotion could deter generic substitution at the point(s) of brand/generic selection (at the physisican or pharmacy level) by increasing the salience of the advertised brands and/or decreasing the attractiveness of generic alternatives. In this manner, as in grocery products, the differentiation efforts of the manufacturer could be seen as reducing competition (Albion 1983). It should be considered that the percentage sales of store brand (unadvertised) grocery products has declined from the early 1980's to less than 15% more recently (Deveny 1994), while the percentage of generic drug sales has remained steady at around 33% after the 1984 Drug Act which was intended to increase generic prescribing (compare Kushner 1986 data with Glaser 1993). There may be some limit to the percentage of generic sales which policy makers can hope to stimulate through traditional regulatory mechanisms, particularly as brand manufacturers gain experience in targeting their promotional efforts toward specific consumer markets.

To facilitate competition, it may be desirable for the FDA to enforce cost disclosure in direct-to-consumer drug advertising. Previous research (Miller and Blum 1993; Reidenberg and Hodi 1991; Rowe and MacVicar 1986) has suggested that physicians tend to be unaware of the prices and relative price ranges of commonly prescribed medication. In Miller and Blum's (1993) study, a sample of physicians were aware of the relative costs of only 37% of commonly prescribed drugs, and the majority of the physicians could not identify the least or most expensive drugs in a particular category. Miller and Blum suggested that drug cost disclosure be included in journal and other drug advertising directed toward physicians, and that drug price information be provided to patients as well. Miller and Blum suggested that until either non-profit consumer organizations or regulators provide consumers with pricing information, "it may be left up to the initiative of concerned hospitals, clinics, and individual physicians" (p. 36) to be aware of and to provide relative patient cost information.

The inclusion of relative price information in manufacturers' advertising has been considered in other product categories. For example, Arterburn and Woodbury (1981) have suggested that price information included in manufacturers' advertising is an indicant of price competition in those industries. Albion and Farris (1987) carry this a step further in suggesting that "manufacturer advertising will usually lead to decreased price elasticity (and/or sensitivity) <u>for the manufacturer</u>. Exceptions are manufacturer advertising that focuses on price or price comparisons" (p. 114, italics in the original). It has been assumed in this research that the brand advertising by drug

manufacturers has the effect of reducing consumers' price sensitivities, partly because of the lack of information on the part of the consumer as to potential substitutes (and price comparisons) for the advertised brands. If this comparative pricing information were included in the direct-to-consumer advertising messages, as well as intra-channel promotions directed toward physicians, both consumers and physicians may be more inclined to choose lower-cost alternatives. The present suggestion may be considered an amendment to other proposals which advocate competitive approaches to containment of health care costs through the addition of further consumer health information relevant to decision making (e.g., Anders 1994; Danzon 1994; Herzlinger 1991; Perri 1989; Sorofman 1992).

The difficulty with implementing such compulsory information would lie largely in the fact that some of the direct-to-consumer messages currently employed are "general focus" or "institutional" advertising messages which suggest seeing a doctor are not intended to be comparative in nature. However, the mechanism for enforcement already exists for this type of information: the FDA currently requires that direct-to-consumer promotions which include both the name of the brand and the symptoms to be treated must include "brief summary" information which describes the potential side effects of the medication. Relative cost information could easily be disclosed in the brief summary information as well. If longer-term projections (Johnstone 1992; Longman 1992; Masson 1991) are correct, advertising by prescription drug makers which include more specific brand-directed messages are forthcoming. The insertion of relative cost information would allow

brands (particularly "me-too" brands) to compete moreso on the basis of price without directly affecting the number of competitors. Pricing information in direct-to-consumer advertising would also be consistent with the expressed desires of other constituencies (e.g., American Academy of Family Physicians 1991; Anders 1994; "We Agree" 1994).

RECOMMENDATIONS FOR FURTHER RESEARCH

The results and limitations of the present study point toward a number of possible research topics. To improve on the present study, the addition of constructs may provide more useful information about the relationships among marketing mix variables. Increasing the number of time periods (observations by month, for example) may provide greater statistical significance in comparing average price change differences. The inclusion of monthly or yearly advertising expenditures on a per-brand basis would incorporate an interval measure rather than the categorical measure above. The inclusion of interval measures for other promotional mix variables (detail selling, other forms of promotion) may also help to explain variances among price changes at the wholesale and retail levels. Some measure of the market-level effects (sales, market share) of direct-to-consumer advertising would also obviously enable broader interpretation of the results.

The incorporation of product life cycle variables may or may not add to the explanatory or predictive power of the present model, since the advertised brands represented drugs which were in various stages of their life cycles (e.g., one brand has been on the market since 1956 and one since 1982), and were assumed to be a representative sample of drugs

on the basis of product life cycle stage. Cocks (1975) has suggested the use of alternative product classifications in the analysis of competition among substitutes, offering that product categories based on prescribed usage would be more valid than chemical composition. For example, beta blockers would be considered to be in the early stages of their product life cycle for the treatment of congestive heart failure, while they would be considered very mature products for the treatment of hypertension. Minoxidil was a mature vasodilator treatment for hypertension as well, until a side effect of the drug was discovered which allowed it to be prescribed as a treatment for baldness. Product categories defined by prescribed use have not been generally applied in the literature, but the use of these data to specify competitive and/or product life cycle relationships might enhance the explanatory power of the model.

A more comprehensive model might also include the measurement of intra-channel activities, especially those directed toward physicians. A conceptual model might include the physician as a "surrogate shopper," or as a member of a trilateral consumption process. Statman and Tyebjee (1985) found increased promotion toward physicians following the enactment of generic drug laws in the 1980s, suggesting that intrachannel promotional activities are important strategic tools. Several studies exist which consider the many influences on physician prescribing behavior (Williams and Hensel 1991; Bearden and Mason 1980; Poulsen 1992; Avorn and Soumerai 1986; Schwartz, Soumerai, and Avorn 1989), but these studies do not consider the effects of direct-to-consumer promotions. A number of possible research questions might be

generated: do ads directed toward physicians which suggest lower consumer price alternatives have any effect on physicians prescribing behavior? Do ads which suggest greater value regardless of price influence price sensitivity of doctors? Are physicians more price sensitive in some product categories than others? If hospital formularies are now buying on the basis of price, will the promotional strategies of manufacturers change in terms of intra-channel messages and direct-to-consumer messages (Larkin 1989)? Will an increase in formulary purchasing, while encouraging lowest-price bidding, actually decrease consumer choices among brands/generics?

A further extension of the present study might incorporate the retail margin effects of advertising through various media. Previous research has considered the differential effects of various media on consumer price sensitivity (Kanetkar, Weinberg, and Weiss 1992; Porter 1976). Research conducted by the FDA would suggest that the information derived from prescription drug advertising is likely to vary depending on medium and format (Morris 1984; Morris and Millstein 1984; Morris, et al. 1986; Tucker and Smith 1987). Previous dual-stage studies have not incorporated medium-specific data, so that the particular influences of advertising through a particular medium on retail margins have yet to be fully developed. However, the communicational aspects of the dual-stage theory would seem appropriate in the case of prescription drugs, particularly since the advertisers choose general product category advertising versus brand-specific advertising, which then may restrict the medium employed.

A broader scope might be applied to many public policy questions presently under review. For example, U.S. congressional leaders have made much of the issue of drug prices in the United States compared with those in other countries (Danzon and Kim 1993; General Accounting Office 1994; Pryor 1992; Staff Report 1991). A vertical perspective would likely show considerable differences in the structure of distribution channels and retail margins among countries. For example, until 1987, Canadian drug makers were required to license their brands, which allowed generic drug companies to manufacture patented medicines for a 4% royalty, thus creating generic equivalency even while brands were under patent. Without this compulsory licensing, the Canadian system now more closely represents the U.S. system, so that the prices observed may not continue to be lower (Conlan 1993b; Lexchin 1993). The dual-stage approach would enable the conceptualization and analysis of specific components of distribution across systems, perhaps providing more realistic comparisons.

More generally, an Office of Technology Assessment report (U.S. Congress 1993) has suggested that "drug prices today tell little about the real value of drugs to patients and the public," while industry proponents argue that the rapid increases in price during the 1980s are relatively unimportant when compared to the actual cost increases of research and development (Vagelos 1990a) and the costs of substituting other medical services (e.g., surgery) for the costs of drugs (McCarthy 1989; Miller 1993). To address this problem, the real "value" of drugs must be considered -- among other things, the relative prices of various substitute therapies. Previous research has attempted to include the

value of newly introduced drugs in the development of price indices (e.g., Reekie 1978). Previous research has also provided evidence that consumers may have a very difficult time determining what medical care "ought to" cost (Ruffenach 1993). At the same time, other studies have suggested that consumers tend to accept prescription drug prices to a greater degree than they accept either physicians' fees or hospital charges (e.g., Linden 1987). Application of marketing theories regarding reference prices or factors which affect subjective perceptions of price, as well as a more comprehensive cost/benefit analysis, would undoubtedly be useful in resolving these problems. Quality-of-life analyses might also lend to a greater understanding of how different brands of drugs may achieve the same desired therapeutic effect in patients, but may also have very different side effects (Hay 1988; Tanouye 1993c; Waldholz 1993), thereby influencing the total "value" of drugs to consumers' lives. Research toward development of the relative value among specific drugs has already begun (Reardon and Pathak 1990).

Other studies might include longitudinal analyses of price/ advertising relationships among undifferentiated products (e.g., produce), analyses of products across varying distribution channels (longer or shorter channels, varying degrees of vertical or horizontal integration), and consideration of price versus nonprice advertising (Arterburn and Woodbury 1981). If the true "vertical perspective" is employed as a framework, in which the total cost of delivery of the product to the consumer is considered, then additional research and theoretical

development would be able to derive a more complete model of drug distribution.

Research in these directions might well lead to a greater understanding of the pharmaceutical industry and enable better decisions on the part of managers within the industry, as well as public policymakers.

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