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¿UNA RELACIÓN IMPOSIBLE? DEFENSA DE LA COMPETENCIA Y DEMANDA CAUTIVA

Título de la comunicación: COMPETITION AND PATENTS: FIELD-OF-USE RESTRICTIONS IN LICENSING AGREEMENTS IN THE PHARMACEUTICAL INDUSTRY

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COMPETITION AND PATENTS: FIELD-OF-USE RESTRICTIONS IN LICENSING AGREEMENTS IN THE PHARMACEUTICAL INDUSTRY

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ABSTRACT

From the published literature of the 1950s, the debate still continues about the role of patents in pharmaceutical industry. The first image asserts that the industry abused of the patent privilege. The second one defends the high amount spent on research and development and the great importance of patents to promote innovation. This debate is strong related with product patents privileges and price competition in the drug industry: if patents are used as a strategy to harm the competitive process to the detriment of consumers or if patents are the best way of promoting innovation and consumer welfare. One of the most common measures taken by the patent owners was the inclusion of field-of-use restrictions in licensing agreements. In this article we focus on these patent use restrictions in order to give light about the likely harm to competition of patents.

1. Introduction

The pharmaceutical industry if often used as the best example of the need for patents. However, there is no consensus about if patents are the best way of promoting innovation and consumer welfare. On one hand, some authors defend that patents are employed as a strategy to harm the competitive process to the detriment of consumers[1]. Patent or patent application holders may take measures (such as settlements of litigation, licensing and cross-licensing agreements) to restrict the output and fix high drug prices. On the other hand, some authors argue that the significance of patents for the pharmaceutical industry is really important given two circumstances: the high cost to discover, develop, and gain regulatory approval for a new medicine and the very low imitation costs relative to the innovator's costs for discovering and developing a new

[1] Boldrin and Levine, 2008; Comanor, 1964, Steele, 1962. Some authors have suggested a price system as a patent alternative, see Polanyi, 1944; Arrow, 1962; Wright, 1983; Kremer, 1998; Stiglitz, 2006.

compound[2]. Patents are really important because many laboratories can duplicate drugs. However, the development costs of generic compounds are relatively modest, without great difficulty and with a very high probability of success. Furthermore, patents are not effective to prohibit competition from drugs which are chemically different but offer the same therapy.

The struggle over the role of patents in the pharmaceutical industry began with the investigations of the Kefauver committee in late 1959[3]. On May 8th, 1961, the Subcommittee on Antitrust and Monopoly of the Senate Committee on the Judiciary submitted its report on the ethical drugs industry. In that report it was said to be monopolistic drug pricing and abuses of the patent privilege in the US pharmaceutical industry. From the published literature of the 1950s, the debate still continues between two images of the drug industry: the need of patents for R&D and the use of patents to limit price competition.

The article is related to a growing literature that examines the use of patent licensing as instrument of entry deterrence. The purpose of this article is to contribute to the debate about the role of patents in the pharmaceutical industrial. In order to give an explanation to this debate we study the likely harm to competition of field-of use restrictions, that is, the use of licensing contracts. In particular we study if patent use restrictions of licensing contracts were used as a strategy to deter competition. The article is also related to other strands of the literature such as the importance of marketing versus R&D in the pharmaceutical industry. The article focuses on the pharmaceutical industry in USA, particularly, the tranquilizer sector, at the end of the fifties and beginning of the sixties of the XX century.

The main source employed to realize this study has been the original Senate subcommittee hearings on Antitrust and Monopoly in 1959-1961 (The Kefauver Committee), centered on the study of price inflexibility of those firms producing ethical drugs in some product categories characterized by their newness and their great importance to the medicine[4].

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[2] Mansfield, 1986; Silverston, 1987 argues that the only industry where patents are essential is the pharmaceutical industry; Levin et al, 1987; Cohen et al, 1997; Grabowski, 1990; Grabowski and Vernon, 1994. Sarett (1974) has shown that the average development costs per new chemical entity were 1.2 million dollars at Merck Laboratories in 1962.

[3] Comanor, 1986.

[4] The four groups studied were antibiotics, anti-diabetic drugs, tranquilizers and corticosteroids. They represented the 42% of all ethical drug sales in 1959. Prescription retail drugs were almost 70 percent of total drug sales at the end of the 50's, Steele, 1964, p. 202. The larger firms produced 87 percent of all ethical drugs.

After the introduction, the remainder of the article is organized as follows. This article begins with a short description of the ethical tranquilizer sector in US in the 1950's. The third section contains a comparison between the expenditures on R&D with those on marketing. In the fourth section we show the likely harm to competition of the field of use restrictions in licensing patent contracts. Finally, in the last part, the main conclusions are drawn.

2. The US tranquilizer sector

One of the most important advents in the 1950's was the introduction of tranquilizing drugs in treating the mentally ill. Mental illness was the Nation's number 1 health problem in the fifties of the XX century in USA[5]. It filled more than half the hospital beds in that country. Around 17 million Americans suffered from some form of mental illness and this problem costed the Nation $3 billion a year[6]. Sales of tranquilizers at the manufacturers' level were estimated to be near $200million a year in 1958 (total annual sales of drugs for the U.S. were roughly $1.8 billion)[7].

The introduction of psychopharmacology was a very significant and successful contribution to mental illness treatment, and lead to the deinstitutionalization movement that rapidly occurred starting in the 1960s. The number of patients in mental hospitals began to decline reflecting the introduction of psychopharmacology in the treatment of mental illness.

There were three main classes of tranquilizers as we can see in table 1, sold under the generic name or a brand name[8]: the phenothiazine derivatives (Compazine and Thorazine the most relevant ones, only sold by Smith Kline & French, (SKF, thereafter); the alkaloids of rauwolfia serpentina (the most important was Reserpine, sold by Ciba under the trade name Serpasil and also by big and small firms); and finally, a miscellanous group, principal among which was meprobamate, sold in USA under the trade name of Miltown by Carter and Equanil by American Home Products (AHP,

[5] In the mid-1950s, the numbers of hospitalized mentally ill people in the United States were of 560,000 (public mental hospitals), Bachrach, (2001), p. 93.
[6] Testimony by Gorman, Hearings on Administered Prices before the Subcommittee on Antitrust and Monopoly of the Senate Committee on the Judiciary, 86th Cong., 1960 (thereafter Hearings), 1st session, part 16, p. 8985.
[7] Silverman and Lee, 1974, p. 327.
[8] The generic name is a non-proprietary name used to designate drug products with the same active chemical ingredients. A brand or trade name is a designation given to a drug by the manufacturer which can be used exclusively by that company to distinguish its product from other products in the same generic category.

thereafter). All of these drugs were sold under prescription (termed ethical products) and they were used for mental patients and for those suffering from anxiety and tension, neurotic symptoms, emotional upsets and the like[9]. The first two groups include potent tranquilizers largely used for the treatment of hospitalized and other seriously ill mental patients: they were really effective in major mental diseases. The other classes of tranquilizers, the most advertised ones, were usually simply sedatives and its effect was mainly of a symptomatic nature (mild tranquilizers). They were advertised for anxiety states and tension states and were suitable for treating the non psychotic patient.

Table 1: Major marketers of mental drugs, 1958

Products	Date introduced	Major marketers	Trade names	Estimated current sales rate (millions dollar)	Price to druggist (50 tablets)
Phenothiazine Derivatives. Potent tranquilizers					
Chlorpromazine	1954	SKF	Thorazine	25	3.03
Prochlorperazine	1956	SKF	Compazine	20	3.03
Promazine	1957	Wyeth Division of AHP	Sparine*	15	3
Perphenazine		Schering	Trilafón	1	
Pecazine	1957	Warner-Lambert	Pacatal	6	
Vesprin				< 1 million	
Substituted propanedoils (muscle relaxants). Mild tranquilizers					
Meprobamate	1955	Wallace Division of Carter Products, Inc	Miltown	15	3.25
		Wyeth Division of AHP	Equanil	35-40	3.25
Phenaglycodol		Eli Lilly	Ultran	3-4	
Diphenylmethane derivatives (basically antihistamine products). Mild tranquilizers					
Hydroxycine	1956	Pfizer	Atarax	9	
Benzilate hydrochloride	1957	Merck	Suavitil	< 1 million	
Azacycolonol	1955	Vick	Frenquel	< 1 million	
Rauwolfia alkaloids. Potent tranquilizers					
Reserpine	1954	Ciba	Serpasil	15	2.25
x	x	Lilly	Sandril		1.92
x	x	Merck	Roxanoid		1.91
x	x	Parke, David	Serfin		1.92
x	x	Squibb	Rau Sed		1.91
x	x	Upjohn	Reserpoid		1.92
x	x	American Quinine	Generic name		1.17
x	x	Many sellers	Generic name		

Notes and Source: *Sparine is half as potent as Thorazine which is less potent than Vesprin. Compazine and Trilafon are more potent than Thorazine: The more potent the phenotiazine derivatives the fewer side effects it produces. Rauwolfia derivatives are safe compounds. Serious side reactions to them have been rare, Hearings, part 16, 1st session, p. 8887

[9] The other classes of drugs are those which can be purchased without prescription and are known as proprietary drugs.

The most relevant firm selling phenothiazine derivatives in USA around 1959 was SKF, primarily a producer of ethical drug specialties[10]. During the late 1940's SKF was interested in researching one compound which might potentiate other drugs, especially sedatives. In the tranquilizer market, the basic research on the more potent tranquilizers was done largely in France, with the development of certain phenothiazine compounds with sedative effects[11]. In 1952 Rhone-Poulenc found a new allergy drug which slowed down bodily processes called chlorpromazine. In 1952, the American company SKF got an exclusive license to use, sell and distribute the compound chlorpromazine in specialty form only, from the French company Rhone-Poulenc which obtained the American patent rights on July 14, 1953 (Rhone-Poulenc applied in 1951)[12]. Thorazine was the trade name chosen by SKF for chlorpromazine and was released for sale in 1954[13]. In 1952, SKF also obtained a license from the French company to sell prochlorperazine under the trademark Compazine, a phenothiazine compound similar to chlorpromazine but much more potent[14]. The patent was issued to Rhone-Poulenc in 1959, september. As table 1 shows, SKF was the only domestic source of supply of Thorazine and Compazine with an estimated sales rate of $24 million worth of Thorazine and $20 millions of Compazine: around 20 percent of the tranquilizer market in 1958 and around 60 percent of the phenotiazine derivatives[15].

The number of antipsychotic drugs grew during the late 1950s when Leonard Cook, in the pharmacological laboratories of SKF, developed a behavioral pharmacological test that distinguished chlorpromazine from the barbiturates and other old sedatives[16]. The introduction of chlorpromazine was a major milestone in the treatment of psychotic patients and Thorazine became the first widely available

[10] 70% of the sales of this company came from items which affect the central nervous system: tranquilizers such as Thorazine (30 percent), Compazine (9 percent) and Thoradex, and stimulants like Benzedrine, Dexedrine and Dexamyl. The remaining 30 percent came from hormones and sulpha drugs plus specialties to treat nasal, skin, allergy and blood pressure disorders, Hearings, 2nd Session, part 17, p. 9481.

[11] France did not allow patents on pharmaceutical products.

[12] SKF got an exclusive license before the patent was obtained, but after it had been applied for by the French company in 1951.

[13] By 1956, over two million patients had been prescribed chlorpromazine.

[14] The president of SKF, Mr. Munns, said: "This restriction is a little academic because we are not in the bulk business at all. We wouldn't be interested in selling in bulk", part 16, p. 8970.

[15] Hearings, 1st session, part 16, p. 8912.

[16] It was common practice for pharmaceutical companies to search for drugs with similar properties that they can patent and market as competing products that are as effective but have less or different side effects. Drugs that are classified as neuroleptics included the following: Haldol (haloperidol), Compazine (prochlorperazine), Thorazine (chlorpromazine), Navane (thiothixene), Prolixin (fluphenazine), Mellaril (thioridazine), and Trilafon (perphenazine).

antipsychotic medication. SKF signed more licensing contracts with Rhone-Poulenc. Thus, in 1956 SKF entered into a combination agreement with the French company to use Thorazine in combination with other products. The product was called Thoradex.

Rhone-Poulenc also signed licensing contracts with other companies such as that with AHP, who received an exclusive license in 1957 to sell promazine (a molecular modification). AHP offered promazine through its Wyeth Laboratories Division under the brand name Sparine (a potent tranquilizer for patients seriously agitated with delirium tremens).

The market for tranquilizers grew, and so did the number of phenothiazine derivatives (a greater number than the original phenotiazines). Various slight molecular modifications followed: perphenazine (Trilafon by Shering), trimeprazine (Temaril by SKF) in 1957 and trifluoperazine (Stelazine by SKF) in 1958. Although there were several tranquilizers, medical opinion inclined to the view that the later modifications of the original phenothiazines were therapeutically similar to the first ones that came out. The advances that have been made since the discovery of the antipsychotic properties of chlorpromazine were small and incremental. There were drugs with similar properties patented and marketed as competing products that are as effective but have less or different side effects[17].

Meprobamate was the greatest seller in the tranquilizer field in 1958. In the mild tranquilizer field, Dr. Berger discovered mephenesin, a muscular relaxant, in England and went to the United States to patent a molecular modification, meprobamate as a tranquilizer. The patent rights to meprobamate were assigned to Carter Products, Inc., which sold the drug in finished form under the trademark Miltown trough its division Wallace Laboratories. Carter licensed one other firm, American Home Products Corp. through its Wyeth division to sell finished meprobamate in the United States under the trademark Equanil (Wyeth paid Carter $1.9 million royalties in 1957)[18].

Reserpine, thought to be the most important of the serpentine alkaloids, was the first tranquilizer introduced commercially in the USA in 1952. In 1933, its value as a hypotensive agent was reported by a group of Indian researches. It was isolated in 1952 in Switzerland by Ciba from the dried root of Rauwolfia serpentine, which had been used medicinally in Europe over 300 years ago for the treatment of anxiety states. Ciba

[17] Steele (1962), p. 156. Testimony by Dr. Lehmann, Hearings, 1st session, part 16, p 9029.
[18] Berger was president of Wallace Laboratories, the ethical drug division of Carter.

Pharmaceutical Company (a wholly owned subsidiary of Ciba, Switzerland) was the owner of the patent since 1956. Reserpine, as we will see, was a competing substance.

The production in bulk form of the most relevant tranquilizers was very concentrated in a few largest enterprises. As we can see in next table, the whole of the US output in bulk form was generated by one company in all but one tranquilizer (reserpine). SKF was the sole manufacturer of US production in bulk form of the patented tranquilizers chlorpromazine and prochlorperazine), Schering the only one of perfhenazine, Pfizer produced all of the hidroxycine in bulk form (Atarax), Carter produced the whole of the US meprobamate and AHP produced all the patented tranquilizer promazine (marketed as Sparine by Wyeth, Division of AHP).

Table 2: Sales by and concentration of production of 22 major drug companies in the tranquilizer sector 1958

EMPRESAS	TRANQUILIZANTES						
	1	*2*	*3*	*4*	*5*	*6*	*7*
Smith Kline&French (SKF)	seller	-	100	100	100	-	-
Schering	-	-	-	-	-	100	-
Pfizer	-	100	-	-	-	-	-
Ciba	56	-	-	-	-	-	-
Carter (Wallace Division)	-	-	-	-	-	-	100*
American Home Products (Wyeth Division)	-	-	-	-	-	100	seller
Upjohn	seller						
Lilly	seller						
Merck	seller						
Olin-Math	seller						
Parke Davis	seller						
Total number of producers among the 22major drug companies	1	1	1	1	1	1	1
Total number of sellers among the 22 major drug companies	7	1	1	1	1	1	2
% of the total production by the 22 largest drug manufacturers	56	100	100	100	100	100	100

Notes and Source: 1: Reserpine, 2: Hydroxycine, 3: Chlorpromazine, 4: Prochlorperazine, 5: Perphenazine, 6: Promazine, 7: Meprobamate.
*: Carter did not make meprobamate, but had the product made for it by other manufacturers, none of which sold this drug in bulk form, Hearings., 2nd Session, part 19, pp. 10773-10776.

3. Selling drugs in the prescription tranquilizer sector

The pharmaceutical sector is characterized by an intense product differentiation and product competition. The same chemical entity may be marketed by different manufacturers under a number of separate and distinct brand names or under its generic

name. During the patent period the original manufacturer could license other firms to sell the drug product, some with their own brand-name products and others with a generic name. Thus, the same drug was marketed under different names: this is called product differentiation. The proliferation of brands made advertising a really important policy to increase sales, especially when the patent period expires[19]. The patent holder used the patent period to heavily promote its product's brand name to physicians. In this way, the physician is familiarized with the brand name and it will lead to widespread prescribing by that name even after the patent period has elapsed[20].

Product competition was also intense in the pharmaceutical sector. When one firm was awarded the patent, other firms attempted to modify the molecular structure of the compound in order to discover a "different" and patentable therapeutic agent. The first great era of drug discovery began in 1953 and it also was the era of molecular modification. The total numbers of drug launches were 127 for the period 1945-54 and 242 between 1955 and 1964[21]. Paul de Haen has calculated that 4,562 new ethical drugs were introduced for the period 1951-1961. However, only 360 were really innovative drugs.[22] The money spent on this kind of useless drugs constituted an important item in the high cost of medical care.

Hence, not all drugs in the market were really innovative drugs (blockbuster drugs). There were a lot of duplicates drugs under misleading names, with a limit incremental therapeutic value, and quite similar to those products already on the market but different enough to win a patent (Comanor, 1966). They are called duplicative or me-too drugs, drugs from which a patient derived no significant clinical advantages or no more benefit than would be derived from an inexpensive substitute. However the number of new chemical entities (a drug or chemical that is without precedent among regulated and approved drug products) was comparatively small. The bulk of spending

[19] All drugs were promoted directly to consumers until 1938, when the only drugs for which prescriptions were needed were some narcotics and the consumers could self-medicate. Congress dictated the 1938 Federal Food, Drug, and Cosmetic Act (FDCA), a law that restricted the consumer's role and reduced the pharmacist's role in the selection of drugs, making the demand for prescription drugs more inelastic than without this FDA's regulation. As a result, after 1938 brand-drug firms greatly increased their advertising and promotion to physicians, Temin 1979a; Statman and Tyebjee, 1984; Temin 1979b, pp. 97-98.

[20] Promotion of the brand name to foster physician loyalty during the patent period has been shown by Bond and Lean (1977). Even after the patent expires the original manufacturer maintains a dominant market share and a substantial price premium.

[21] Schmid and Smith, 2005, p. 1035.

[22] Paul de Haen, 1962; Munos, 2009; For the period 1957-1961 the total number of new chemical entities introduced were 233 with annual average sales as a percentage of total ethical drugs sales of 20%, Grabowski et al (1978), p. 136.

in research by pharmaceutical companies was to exploit and market the foreign advances or to modify the original drugs just enough to get a patentable derivative, but not to change it enough to lose the original effect[23]. An example of that duplicative research has been the molecule manipulation intended to bypass patents and other priority rights and which has resulted in the flood of me-too products. There was a large effort to invent around existing patents to find a new product which has similar therapeutic properties to those already on the market. These molecule manipulations were purported to have the same therapeutic effect as existing products. The great majority of "new" drugs were just variations of older drugs already on the market[24]. Despite this fact, it is also true that these me-too drugs have led to an increased rivalry and to an intense competition in the drug industry among patented drugs.

Regarding the tranquilizer sector, most American drug firm research was not basic research (the basic drug was found in France, Switzerland, and England), but product development: the further exploitation of an already accomplished basic discovery. The little importance of basic research was very clear in the case of some major tranquilizers which were sold by the big enterprises. Smith, Kline, and French owed its growth not to its own research, but to its ability to take advantage of promising European discoveries. For example, SKF did not discover the simple compound chlorpromazine but did a great deal (clinical work to get the drug available for the medical profession in the US) in getting this compound accepted by the FDA[25]. SFK bought in bulk to Rhone Poulenc the basic compound and did the checks in order to put the basic compound into tablets, and in the packaging stage.

There were many tranquilizers but no great many improvements since any diminution in the incidence of side effects could be demonstrated with the new drugs. There was any advantage for developing an increasing number of some 60 or 70 tranquilizers, although it is reasonable to have 2 or three representatives of a class of tranquilizer, because various drugs have various side effects. It was the incentive of

[23] Testimony of Frederick H. Meyers, associate professor of pharmacology, University of California, in Hearings, 2nd Session, part 18, p. 10,394. One habitual practice nowadays is the so called "evergreening" in which pharmaceutical patent owners use the law to retain rent from them by either taking out new patents and to extend their intellectual property rights. It refers to threats made to competitors about a brand-name manufacturer's tactical use of pharmaceutical patents. "Evergreening" is used by manufacturers of a particular drug to restrict or prevent competition from manufacturers of generic drugs, Faunce & Lexchin, 2007.

[24] The former head of research at Squibb, estimated that more than half of the drug research of this company was driven to come up with copy-cut drugs, Hearings, 2nd Session, part 18, p. 10,380.

[25] SKF had to demonstrate that the drug was safe for human use in all its applications.

obtaining big profits the reason that led to the testing of a great number of molecular variations[26].

The me-too business was made possible by the fact that the agency authorized since 1938 to regulate advertising and to approve prescription drugs, the Food and Drug Administration (FDA, thereafter), usually approved a drug only if it was better than a placebo and it was only obligated to pass on its safety, not its efficacy. Sometimes not even a minor difference existed between different products but they were advertised by different companies as different compounds. Only new drugs required clearance by the FDA but new combinations of familiar drugs did not have to be reevaluated.

In the pharmaceutical industry, where products which embody the same chemical compound but which are produced by different firms were similar to one another, advertising plays a very important role[27]. Once a firm discovered or introduced a new drug, the primary way to increase sales was advertising. Since 1938 the decision about the patient's consumption of any drug with substantial therapeutic effect was in the hands of the physician, who is the person who prescribes the drug. This is a particularity in the prescription retail drug market, the absence of consumer sovereignty because it was not the consumer who made a decision to purchase, but the physician. This means a very inelastic individual patient's demand curve and the inability of the patient to purchase any but the specified drug. Sole purchasing authority lies with the prescribing physician, who orders the specific drug for which the patient must pay. Moreover, the druggist was also captive to the trademark name written by the physician. During the 1950s, more than 40 states in the United States enacted anti-substitution laws or regulations. These laws constrained the use of generic drugs or of those drugs sold under their generic names[28]. In that situation, the pharmacist was legally bound by State law to fill the prescription as written by the doctor.

The simple pace of new product introduction has been a major factor which has increased the effectiveness of heavy advertising and promotional expenditures. The final result is that doctors prescribed only a few of the many available brand name drugs, the most advertised drugs, those of the big companies, and the incapacity for smaller firms to finance selling campaigns.

[26] Galbrecht and Klett, 1968.
[27] Comanor and Wilson, 1967.
[28] Spitz and Wickham, 2012.

The brand companies tried to persuade physicians to use a brand-name drug for reasons of quality rather than price. Leading pharmaceutical companies justified their great expenditures on promotion and advertising arguing that a trademark gave a guarantee of purity, strength and quality of a well-known firm with a recognized reputation. Generic prescribing would be unsafe because of the existence of substandard drugs sold under generic names, defining substitution as a health hazard. Consequently, a brand-name inspired a high confidence to the physician and this is the reason of the great percentage of drugs prescribed by brand-name[29]. In addition, a risk-averse physician may not prescribe a drug by its generic name until its efficacy is proved. Moreover, doctors were not sensitive to price differences since they tended to be ignorant about the prices charged by pharmacists and habit accordingly played a strong role in the physician's prescription practice[30].

For a small company it was really difficult to finance selling campaigns and excesses recorded profits in the pharmaceutical industry (about $750 million per year in 1958)[31]. Promotion expenditures were truly significant in relation to researching and development (R&D)[32]. For example, the amount spent on R&D in 1958 by the 20 largest companies with higher annual sales of drugs only represented 6.4 percent of their total sales in 1958 ($2.3 billion). This proportion was not really very high taking into account that their selling expenses were 24 percent (and one third of total cost of production[33]) and their net profit 13.1 percent[34]. These data (see table 3) show that selling costs were almost four times the research expenses[35].

Table 3: Breakdown of sales dollar, 20 major drug companies, 1958
(In percent of sales*)

	20 Drug Companies	Smith Kline&French	Carter Products	American Home Pr.	Ciba

[29] However, sales promotion for drugs sold mainly through hospitals was very low, Leffler, 1981, pp. 53-54.
[30] Kendall and Schoner, 1991; Temin, 1980, pp. 102-106.
[31] Silverman, 1976: 121, Clarkson 1979; Slatter, 1977; Lall, 1978, Stiglitz 2006; Boldrin and Levine, 2008.
[32] Although investment in R&D has considerably increased since 1950, the number of drugs annually approved is not greater, Munos, 2009, p. 959.
[33] There were some firms with higher selling and distribution costs, such as Upjohn with a percentage of 28.8, or Schering company, with a percentage equal to 32.7 of their sales dollars, testimony of Mr. Brown, president of the firm, Mr. Upjohn, president of the Upjohn Co, and Senator Kefauver, Hearings, 1st Session, part 14, 1960.
[34] Testimony by Senator Kefauver, Hearings on Administered Prices before the Subcommittee on Antitrust and Monopoly of the Senate Committee on the Judiciary, Hearings, 2nd Session, part 19, 1960.
[35] The most profitable firm (Carter, with a profit before taxes of 43.8 percent of sales) had the smallest research budget (2.7 percent of sales), while the least profitable firm (Panray, 10 percent of sales) is estimated to have had the highest relative research budget (15 percent of sales), during the year 1959.

Net Profit	13.1	17.2	20.4	14.7	12.7
Taxes	13	20	23.4	15.9	12.9
Selling expenses	24	19.5	27.8	24	33.9
General& Administrative expenses	11.2	10.9	6.5	14.9	7.4
R&D expenses	6.4	8.9	2.7	3.2	13.9***
Cost of goods (**)	32.3	23.5	19.2	27.3	19.2

Notes and Source: *: includes royalties and other income; **: the cost of goods include labor costs, material costs, bottling, finishing into tablets or capsules, and depreciation on plant, ***: 3 percent of the 13.9 is for the patents to the Swiss company, being US research about 10 percent, Hearings before the Subcommittee on Administered Prices on Antitrust and Monopoly of the Senate Committee on the Judiciary, 86th Cong., 1st session, part 16, pp. 9176-9177.

Tranquilizer advertising was the bulk of the present medical advertising, as indicated the executive director of the National Committee against Mental Illness. For example, Miltown and Equanil, were highly advertised as a condition of Wyeth's license from Carter being that Wyeth would spend at least 20 percent of total meprobamate sales revenue in promoting its sales.

The importance of promotion expenditures for a particular drug is well illustrated in the tranquilizer sector. Next table presents the cost of Miltown meprobamate per tablet if the production is of 1,000 tablets. Table 4 shows that advertising, promotion and clinical samples cost 1 cent per tablet (Carter's total advertising and promotion costs for Miltown was $9.2 per year per doctor in 1959) compared to seven-tenths to manufacture the drug, that is, about one and a half times more. Research and royalties were four-tenths of a cent per tablet, less than one-half of expenditures for advertising and promotion. The net profit by the manufacturing and selling of Miltown was 23 percent on each tablet.

Table 4: Miltown costs and profit per tablet by Carter, March 31, 1959 (cents per tablet)

Carter receives from wholesaler	5.1	
Manufacturing costs	0.7	17,9%
Selling expense and administration*	0.4	10,3%
Advertising, promotion and clinical samples*	1.0	25,7%
Research and royalties*	0.4	10,3%
Income taxes*	1.4	35,90%
Total cost per tablet	3.9	100
Net profit	1.2	

Notes and Source: * These expense items are average for Carter's ethical drug business, table supplied by the president of Carter Products, Inc., Mr Hoyt, Hearings, 2nd Session, part 16, p. 9161.

Although there was hardly any overuse of the potent tranquilizers, because patients don't like to take them as they have side effects which are not pleasant, the less potent ones, those where the therapeutic effect has not been proven, were often overused to a tremendous degree[36]. The abuse of the minor tranquilizers, especially of meprobamate has been tremendous although there was little evidence that the drug was qualitatively different in its clinical effects from a number of other hypnotics including barbiturates[37]. The danger with this practice was the addiction problem. For example large doses over a long period of time of meprobamate, (Miltown, Equanil and various other trade names) may produce addiction just as barbiturates. Meprobamate has been popularized through a tremendous advertising campaign. For example, Compazine, a drug effective in the severe disturbances, was also sold for the milder mental and emotional disturbances even though it had not been shown to be as effective in mild disturbances[38].

An additional problem about promotional literature involves the amount of information which was given to those physicians who were not really specialists in the field of psychiatry. Psychiatric drugs were prescribed for many reasons by every doctor. The physician who was not a psychiatrist depended that much more on the accuracy of information which came from the promotional literature.

[36] In case of the milder emotional disturbances, a great number of patients (from 20 to 40 percent), would improve with any kind of a pill, because of the so-called placebo effect. That will also hold true for depressions, Testimony by Dr. Lehman, Hearings, 1st session, part 16, pp. 9028, 9072.

[37] As it was reported in a study by Lasagna, doctor at Johns Hopkins, part 17, p. 9507. There was no evidence that meprobamate was different from a placebo in treating anxiety in psychiatric outpatients although it was better than a placebo in hospitalized neurotic and psychotic patients, Laties et al. 1958

[38] Testimony by doctor Freyhan, Hearings, 1st Session, part 16, p. 9073.

In conclusion, advertising cannot manipulate the total incidence of diseases but it can shift the existing effective demand from one product to another. Even though a doctor might believe that different compounds have similar therapeutic effects, he was never quite sure, and the prudent course of action was to prescribe the drug which had become well-known[39]. The extensive introduction of duplicate products made possible that significant differentiation could be achieved since product competition was intense. Firms stressed in their marketing activities the improved quality of new drugs: drugs can be used in the treatment of the same classes of disorders as the original drug, but could be more potent, or less toxic, or with a different variety and incidence of concomitant side effects [40].

4. Patents and price competition

In this section we study the effect of field of use restrictions in licensing agreements in the tranquilizer sector. The restriction prohibiting licensees to sell in bulk form was included in the licensing contracts that Rhone-Poulenc (they obtained from the Patent Office an American patent) issued to SKF to manufacture and sell the drugs chlorpromazine under the trademark Thorazine; in the contract that Rhone-Poulenc signed with Wyeth, Division of American Home Products, to produce the tranquilizers Phenergan and Sparine; and in the contract that Carter Products agreed with Wyeth, Division of American Home Products, to sell meprobamate under the trademark Equanil[41].

In the tranquilizer sector all drugs were patented. In principle, only the owner of the patent could manufacture the product, thus, we should find a monopolist selling the patented drug. However, licensing was a very common strategy in the pharmaceutical industry. Licensing other firms means that more than one firm can manufacture and sell the product. Other habitual practice was to license only big firms, being smaller firms excluded from licensing contracts. The owner of a patent decided most of times not to

[39] Almost 90 percent of all prescriptions were written by brand name, in part due to the fact that most frequently prescribed prescription drugs on the market were still under patent (1958 National Prescription Survey, Pharmaceutical Extension Service, Rutgers University, as reported in Hearings, 1st Session, pt. 15, at 8776.

[40] Older drugs were rapidly replaced by new ones. For example, in 1959 only 33% of sales were from products discovered before 1951, Comanor, 1964, pp. 373, 376.

[41] This drug was sold since 1955 by Carter under the trade name of Miltown (and its distributors American Cyanamide and Lederle). Annual sales of Equanil were higher than those of Miltown, although the bulk powder sale of meprobamate was reserved to Carter. Wyeth tableted and bottled the bulk powder which the patent holder, Carter, sold to it, increasing in this way the licensor its total profits through extensive royalties.

license small firms in order to exclude them from the competition given their lower costs (there are not economies of scale in production) which means that they could sell the licensed drug cheaper than the licensor[42]. Furthermore, most licensing contracts included restrictive licensing practices, specially, a field of use restriction: a provision indicating the firm granted a license to make and sell in final packaged form only, not in bulk form. In this way, with a field-of-use restriction in licensing agreements small companies could not get access to the bulk material in the case a big company had got the patent and does not give a license to small firms. Therefore, with this restriction small firms couldn't buy in bulk, tablet and put in bottles, but exclusively to buy the finished product (at a higher price)[43].

We distinguish two markets where ethical drugs could be sold: the retail market and the institutional market. In the first one, as we have shown in previous section, the only person who decided about the drug prescribed was the doctor, who normally didn't know the prices of the drugs he prescribed. The patient, although he knew about cheaper drugs, was not able to decide and buy the lowest priced drug. The pharmacist and the patient were captive to the trademark written in the prescription by the doctor.

Therefore, in the prescription retail market there was a very inelastic demand curve. Having an inelastic demand curve does not mean monopoly power on the part of the seller if sellers really compete among them. As we will see, in the prescription retail market there was no price competition among sellers because small firms were excluded from the market and big firms did not compete.

However, the institutional market was sensible to prices. In this submarket there was no longer a captive aspect to the market and the manufacturer must compete on generic basis. In the case of hospitals, the hospital pharmacist was encouraged to prescribe those products listed on the hospital's formulary and the physician agreed that prescriptions written under a brand-name shall be interpreted as if they were generically

[42] Steele, 1962. Another common fact was that big companies established patent interferences among them. When there was a patent interference it was highly probable that the final result was unpatentability. The strategy followed by big companies researching along similar lines often allowed a patent applicant to go ahead and to get the patent, thus, they used a private settlement of claims. All that one firm withdraw from the interference and got licensing privileges through a cross licensing arrangement thus avoiding testing patents and a very careful scrutiny of a patent application. Cross licensing was a system by which the product could be marketed while the patent fight went on and the parties insured the continued right to market the new compounds.

[43] The estimated use for tablet making charge was $2 per 1,000 for meprobamate, Hearings, 1st Session, part 14, p. 7857.

written prescriptions, unless the physician indicated otherwise[44]. The hospital formulary committee decided on the drugs wanted and quantity purchases were made on a best bid basis. Hence, unlike it happened in the retail submarket, where physicians and pharmacists did not have any incentive to prescribe the cheapest drug, in the institutional submarket there was motivation to seek price economies.

4.1. Price competition in the retail market

Understanding price competition in the retail market requires distinguishing three different possible situations depending on the number of firms compounding finished drugs from bulk powder active ingredients: only one producer, a few big firms producing the drug, and several manufacturers, big and small ones. Although there were several firms involved in pharmaceutical manufacturing with access to drug powder, the production in bulk form of the different tranquilizers was usually concentrated in only one firm, the owner of the patent, as it was shown in table 2. The distinction of the different situations is important in order to understand the pricing policies of the large drug firms in the tranquilizer sector, where there were no important unpatented tranquilizers. As we will see, price competition was absent in the retail market in all those three situations.

The first scenario is where only one company produces and sells the drug: this happened with phenotiazine derivatives. In this case, the owner of the patent is a foreign company who gives an exclusive license to manufacture a drug to a big American firm which sold it under a brand name. The licensing contract included a field-of-use restriction which specified not to sell the drug in bulk form, that it, the only seller of the drug in bulk form is the licensee firm. We find this condition in the contracts that Rhone-Poulenc signed with SKF to produce chlorpromazine and prochlorperazine under the trade names Thorazine and Compazine. SKF established a price for the wholesale druggist (50mg Thorazine tablet in quantities of 500 tablets) of $3.09, plus 15 percent margin to the retail druggist, that is, a quantity of $3.64 which was the price the retail druggist paid for it. The wholesaler maintained a 15 percent margin to the retail druggist. This price remained the same from 1954 to 1969. This situation is also found with the product Sparine, only sold by Wyeth in US at a price to the retail druggist of $3

[44] Memorandum 18 of the National Pharmaceutical Council, 1957, Hearings, 2nd Session, part. 21, at 11,835-36

in 1958 (50 tablets). It is clear that no price competition existed in this first case, where there was only one firm selling and producing the drug.

The second scenario we can find is where there are only a few big firms with access to the drug in bulk form because they have received a license from the patent owner: this is the example of the tranquilizer meprobamate where only two firms manufactured and sold this drug. The licensing contract included a restriction indicating that the licensee would make no sales in bulk powder to any other companies. In this case absent price competition is encountered in the retail prescription market since the licensor and its licensees followed the strategy of offering the same price for the same drug. This happened with Carter, the owner of the patent of meprobamate. The bulk powder sale of meprobamate was reserved to Carter, which sold the drug under the trade name of Miltown (though its Wallace division). AHP, through Wyeth Division, sold meprobamate, under a license that entered into with Carter in 1955 (Wyeth tableted and bottled the bulk powder which Carter, the patent holder, sold to it) to produce meprobamate under the brand name Equanil. The price of Miltown was established in line with competition and was determined in April 1955, and the product was marketed in the following month. Carter was selling Miltown to the wholesaler druggist at 5.2 cents a tablet (the druggist paid to the wholesaler 6.5 cents and the final price to the consumer was 10.8 cents per tablet)[45]. Miltown price remained the same from 1955 to 1960. Wyeth established the same price for Equanil, even although Wyeth must made a royalty payment to Carter of 13 cents, and its manufacturing costs were much higher than those of Carter, $0.7 cents and $1.5 per tablet, respectively.[46]

The tactic of pricing the same patented drug at the same level by big companies in the prescription retail market has also been found in the third case: where there were several firms, small and big, involved in pharmaceutical manufacturing with access to drug powder. The drug was marketed under different brand names and also under generic names. We find this scenario in the case of reserpine, a patented drug by Ciba. This firm decided to license the patent widely, and also allowed the licensees to sell

[45] Of this price, Carter's profit is about 1.2 cents per tablet, see table 4.

[46] Carter has the product made by five manufacturers of its own selection to whom it has imparted its know-how. Most (62 percent) of the bulk that Carter bought from other companies was resold to others. The price of bulk meprobamate that Wyeth purchased from Carter was of $4,98 greater than that of Carter per 1,000 tablets (a 43% higher than the price Carter must pay for the bulk powder). Wyeth paid Carter $1.9 million royalties in 1957 (a royalty of 5 percent of selling price), Hearings, 1st session, part 16, p. 9185.

the drug in bulk powder form. The licensees sold the bulk powder to small firms which manufactured their own capsules.

Ciba charged a wholesale price of $39.5 per bottle of 1,000 (25 milligram tablets) and $4.5 per 100. The final price to the consumer was of $65.83 given the 40 percent markup on the selling price of the druggist. In contrast, some larger manufacturers such as Lilly, Merck, Parke, Davis, Squibb or Upjohn, which got a license from Ciba, sold reserpine at the same price, a much lower price than that fixed by Ciba. However, smaller firms, with no advertising costs, reduced prices to as much as 90 percent below CIBA's price. The lower costs for smaller firms allowed them to reduce their prices to about $1.91 per fifty tablets to druggist (the price which Carter fixed to the wholesaler druggist was of $2.60 per bottle of fifty capsules, and $3.25 to the retailer). Some firms quoted prices as low a Panray's $2.65 per bottle of 1,000 to the druggist (the wholesaler has a reduction of a 20 percent to the druggist[47]). Other major firms dropped their advertising of this product, by and large, and their prices were cut. Despite the large difference in the price of reserpine between brand names and unbranded versions (those of small firms) large market shares were held by branded products. Serpasil was more widely prescribed than reserpine. Panray, a small company did almost no business with the druggist, only trough institutions and hospitals even though its price was much lower than Ciba's price[48].

Therefore, when a drug group was introduced and received approval by the FDA, some manufacturers tried for a share of the prescription retail market not through price competition but choosing any method that will establish their trade name in the mind of the physician, the person who prescribed the drug. This resulted in an increase in advertising in the 1950s from approximately 10 to roughly 15 percent of sales[49]. The greater part of advertisement and promotion effort went into persuading doctors to prescribe specific brand-names, and by the 1960s more than 90 percent of the pharmaceutical companies' spending on marketing was aimed at doctors (only 10 percent to pharmacists and hospitals)[50]. This strategy was frequently employed by big firms for maximizing the value of their innovations and made possible a high degree of

[47] Report, p.18.
[48] Testimony by Pantzer, president of Panray, Hearings, 1st session, part 16, pp. 9367-9369, 9380.
[49] Temin, 1979a, p. 431.
[50] Donohue, 2006, p. 668.

market control from the supply side[51]. The fact that a same drug was sold under different trade names increased even more the product differentiation in the pharmaceutical industry. This is the reason of the high levels of prices for the patented drugs, used to finance selling campaigns due to the tremendous product rivalry although with little or no price difference involved. However, the high costs of financing a sizable selling effort made it impossible for small sellers of generic name products to obtain any significant share of the retail prescription market.

It is clear that price competition among ethical drugs was effectively prevented by the existence of high expenditures on advertising and promotion. Advertising to persuade physicians was employed to secure for a given firm a greater share of that demand. The existence of lower prices did not involve a risk for the licensor of losing his monopoly power in the prescription retail market. In this retail market, most of prescriptions were written under branded trade names, even though small firms might be selling at prices which were a small fraction of their larger rivals. When a doctor did prescribe, the patient had no choice but could only purchase the brand that the doctor had prescribed at a price 25-30 percent higher of which may be for promotional cost. As a result, the pharmacist and the customer, with the prescription in his hand, were captive to the trademark name written by the physician. Thus, the consumer who had a prescription for a particular trade name could not be sold anything else even though there were other manufacturers of that drug selling at lower prices[52]. Although there was no price competition in the retail market, the high product rivalry forced the pharmaceutical firms to engage in costly marketing campaigns in order to sell a particular brand. Marketing was the strategy followed by fig firms to differentiate its products from those of the competing patented drugs.

4.2. Price competition in the institutional market

Although the little companies were not able to get into the retail drugstores because they couldn't do the advertising and carry the financial costs of detail men, they were nevertheless very active in connection with sales to the institutional market: Military Medical Supply Agency, MMSA (it was the central purchasing agent for all

[51] Steele, 1964; Boldrin and Levine, 2008. These authors establish a relationship between patent protection and concentration in the pharmaceutical industry but not between innovation and patent protection since most of drug innovations have been made in countries where there was no patent protection.

[52] The last of these antisubstitution laws was repealed in 1984 (most were repealed in the mid to late 1970s).

hospitals and dispensaries in the Armed Forces), hospitals, cities, and Veteran's Administration (VA). In this market, which is price sensitive, small companies were a serious competitor because of their lower prices. MMSA was required to purchase drugs by generic names at the lowest possible price from any qualified bidder (suppliers to MMSA must meet specific standards of quality).

The usual way the institutional buyers purchase drugs was through a bidding process. When the government or a hospital solicited bids it could use two types: a negotiated bid and a competitive or advertised bid. The negotiated bids were usually requested when there was a patented drug product available from only one or very few manufacturers. In this case there was a chance to negotiate the final price. There was no public opening and the government called up each bidder and tried to convince them that if they reduce the price they will get a certain amount of business. In a competitive or advertised bid the government asked for bids on a drug under its generic names, and were normally applied when quality drugs were available from more than one source and there was no place to negotiate the price. There were specific deadline dates at which the bid must be returned to the purchaser. In this type of bids, there was a specific time and public opening, at which time any representative could enter the bidder's room and listen to the bids as they are opened.

To be accepted by the government, the product of each manufacturer had to meet some specifications for the particular drug involved. Federal and State agencies had certain quality controls procedures such as inspection of the possible suppliers' plants, of the manufacturing processes, or took random samples of each lot of drugs which were analyzed by the FDA. The government could accept bids by companies selling drugs under the generic name and under trade-name drugs if they were of equal quality.

As we did in the prescription retail market, three possible scenarios can be found in the institutional market. First, when only one firm could bid the normal situation is to find that firms offered a discount to the buyer. For example, this happened with the drug Sparine, only sold by Wyeth in US. This company negotiated a bid to MMSA in April 1958 at $24.42 per bottle and to VA at $24.51 per bottle in January 1958, whereas the retail druggist was paying $32.49[53]. Regarding the product Thorazine, SKF, the only producer of this drug in US, also made sales to the Government[54]. For example, MMSA

[53] Hearings, 2nd Session, part 16, pp. 8967-8969, 9276-9277.
[54] About 70% of the volume of their drugs go to State and Federal mental hospitals, testimony by Munns, president of the company, Hearings, 2nd Session, part 16, p. 8927

since 1956 has bought from SKF $2,215,113 worth of Thorazine at negotiated prices. In 1956, in the 25-milligram size in bottles of 50, they purchased twice, at $2.19 and $2.21, where the druggist paid $3.03. In 1957 they paid $2.27 for the same type and size of Thorazine. In 1957 the MMSA made one purchase in the amount of $33.46 for the type 100 milligram in bottles of 500. At the same time the price to the retail druggists was $46.32. In 1958 they made two purchases, one at $2.17 and another at $2.19 in the 25-milligram size in bottles of 50. In 1958 the MMSA made one purchase in the amount of 33.37 for the type 100 milligram in bottles of 500. At the same time the price to the retail druggists was $46.32. In 1959 MMSA made a purchase for $20.8 of the 25-milligram size in bottles of 500, being the price to the retail druggist $28.79.

Regarding the purchases of the drug via injection, in 1956 the agency bought two quantities to SKF: one for 3.16 and another for 3.17, 25 milligrams, 2-cubic centimeter sixes injection. IN 1957 MMSA made one purchase at 3.27, another one in 1958 in the amount of 3.12 for the same product. During this same period of time, for the same product, SKF charged the retail druggist 4.38.

It is clear from the data shown that where there was only a bidder the Government paid a lower price in relation to the price paid by the retail druggist. This reduction was around 25-30 percent. Therefore, this difference between prices to MMSA and to retail druggist was not a great negotiation[55].

The second scenario happened when there were a few bidders, the case of meprobamate. The governments advertise by the generic name meprobamate, but in the US there can only be two real bidders: Carter and Wyeth. THE MMSA tried asking for competitive bids, but they always got the same result. Wallace and Wyeth bid exactly the same price and the Agency was forced to settle the matter by splitting the award or by drawing lots or making the decision on the basis of a labor surplus area (see next table). Hoyt, the president of Carter explained the situation saying that the firm has a standard price for everyone: for the wholesale druggist in the city and county and State hospitals, and also for the military supply depots. The last two categories received discounts because the orders were in large amounts[56]. The wholesaler who bought meprobamate paid $3.25 for a package of 50's (the government paid $2.5) and the

[55] SKF also made sales to VA at very similar prices to those offered to MMSA.
[56] Testimony by Hoyt. The MMSA bought in bottles of 500 (except in one bid) as against sales to the druggists in bottles of 50's, Hearings, 1st Session, part 16, pp. 9185-9186.

MMSA paid $20.25 for a package of 500. The price per tablet to the druggists was of 6,5 cents although the MMSA only had to pay 5 cents, a discount around a 23 percent.

Table 5: US Military Medical Supply Agency bids on negotiated contracts, 1958-1959, meprobamate, bottles (500's)

Date	Number of bottles Solicited	Succesful bidder	Unit Price	total price	Other bidders	Prices
Jan, 13, 1958	13,680	Wyeth*	22,5	307.800	Wallace	22,5
Jan, 21, 1958	2,000	Wallace	2.5 (it was a tie bid, small business)**	5,000	Wallace	2.5
Mar, 3, 1958	19,200	Wyeth*	22.5 (tie bid),	432,000	Wallace	22.5
April 11, 1958	19,200	Split	22.5	432,000	Wallace	22.5
Nov 17, 1958	6,000	Wyeth	20.25	121,500	Wallace	22.5
feb 5, 1959	43,560	Wallace (we got it by a draw)	20.25	882,090	Wallace	20.25
apr 6, 1959	22,128	Wyeth	20.25	448,092	Wallace	20.25
sept 2, 1959	18,768	Wyeth*	19.845	372,281	Wallace	19.845

*: it was awarded the bid because they were in a labor surplus area,

**: in bottles of 50's, Source, Administered prices, part 16, p. 9200.

In conclusion, in these two first scenarios we could find in the institutional market, that is, when only a firm or a few firms manufacture and sell a drug, we can see that the sellers shared the market or the only seller monopolized it. This was possible because the licensing contract restricted the sales in bulk powder form by licensees, preventing small firms from purchasing the active ingredient in bulk form from the licensees. This happened with the patented tranquilizers meprobamate, promazine and chlorpromazine purchased by the Military Medical Supply Agency at prices which were 25 to 35 percent below the price to the retail druggist[57].

The last scenario we can find is where not only big firm, but also small ones manufactured the drug and were able to made bids to the institutional buyers. That means that licensing contracts, in this case, do not include a field of use restriction and that small firms were compounding finished drugs from bulk powder active ingredients This is the case of reserpine, a drug developed by CIBA Pharmaceutical Co., but widely licensed, allowing the licensees to sell the drug in bulk powder form. Small firms could fix lower prices due to its lower fabrication costs. There were several supplies which made bids at one time or another. Institutional buyers asked for these bids generically. The result was a drop of the prices for reserpine to the MMSA from 1.39 to 60 cents from 1956 to 1959 (a reduction higher than 60 percent). As next table shows, Eli Lilly won the bid of $1.39 per bottle of 1,000 in 1956 and CIBA won the contract

[57] US Senate, Subcommittee of the Committee on the Judiciary, Report of the Committee on the Judiciary, Administered Prices: Drugs, Report 448, 87th Congress, 1st session, p. 94, 1961.

with a bid of 60 cents a bottle in 1959 (only 1.5 percent of CIBA's price to the retail druggist of $39.90[58]).

Table 6:

Military Medical Supply Agency orders of Reserpine, 0.25 mg, bottles of 1,000

Date	Method	Quantity Solicited (bottles)	Succesful bidder	Unit Price	total price	Other bidders	Prices
feb 20, 1956	advertised	685	Eli Lilly	1.39	3,948	E.R. Squibb	6.1
feb 20, 1956	advertised	2,160	Eli Lilly	1.39		Smith-Dorsey	2.57
feb 20, 1956	advertised	672	Eli Lilly	1.39		Ciba Pharmacal	2.04
						Pitman-Moore Co	3.25
oct 3, 1956	Negotiated	1,080	Ciba	1.15	2,469	Lilly	2.35
oct 3, 1956	Negotiated	1,224	Ciba	1.15	2,469		
nov 29, 1956	advertised	2,808	The Panray Corp	1.10	3,088	American Pharma Co	1.29/1.26/1.27
						Kasar Co	2
						Eli Lilly	1.16
						Merck Sharpe&Dohme	1.38
						E. R. Squibb	2.35
Feb 11, 1957	Negotiated	2,472	Ciba	0,92	3,797	American Pharma Co	1.04
		1,656	Ciba	0,92	3,797	American Pharma Co	1.08
						Eli Lilly	1.22
						Panray Corp	1.1
oct 14, 1957	Negotiated	3,024	Ciba	0.76	2,298	Brewer&Co	1.39
						Bryant	1.42
						Eli Lilly	1.66
						Merit Laboratories	1.7
jan 30, 1958	Negotiated	6,912	The Panray Corp	0.7	4,838	Bryant	1.6
						Ciba	0.76
						Eli Lilly	0.773
						E. R. Squibb	2.35
Jun 20, 1958	advertised	4,200	American Quinine Co	0.65	2,772	American Pharma Co	0.84
				0.67/0.7		Brewery Co	0.9
						Bryant	1.1
						Ciba	0.7

[58] The cost of production of such a bottle was 1.6 percent of the wholesale price.

						Eli Lilly	0,73
						Merit Laboratories	0,93/0,89/0,97
						Nysco Laboratories	0,95/0,96
						Panray Corp	0,7
						Premo	1,79
						E.R. Squibb	2.35
						Success Chemical	0.9
sep-58	advertised	3,432	Ciba	0.64	2,196	American Pharma Co	0.89
						Brewer&Co	0.96
						Hamilton-Blair	1.18
						Eli Lilly	0.738
						Merit Laboratories	0.84/0.87/0.92/0.86/0.9
						Nysco Laboratories	1.2
						Panray Corp	0.65
						Premo	1.39
						E. R. Squibb	1.72
						Strong Cobb	1.21
feb 24, 1959	advertised	3,960	Ciba	0.6	2,376	American Pharma Co	0.82
						American quinine	0.65/0.63/0.68/0.64/0.67/0.66

The case of the reserpine is the only case we can find where there was a great variation in prices, although it was a patented drug. The reason to explain this unusual situation is because Ciba licensed several other companies and in the licensing contracts did not appear a field of use restriction restricting licensees to sell in bulk form. Thus, small firms could get access to the manufacturing process and sold reserpine at a lower price than the large firms, most of them marketed it under generic names[59]. The introduction of more bidders generated substantial price reductions in the institutional market, particularly in competitive bids[60].

The presence of smaller bidders firms forced to big companies to enter in price competition, lowering its prices, if they wanted to win the bid. However, in the case where there were only one or two big bidders, the difference in prices between the retail market and that asked for in a bid was much lesser.

[59] More than half of the most important patented drugs were produced by only a supplier, Steele, 1964, p. 201.

[60] Hearings on Administered Prices before the Subcommittee on Antitrust and Monopoly of the Senate Committee on the Judiciary, 86th Cong., 2nd Session, part 18, 1960, p. 10595.

5. Conclusions

Pharmaceutical firms holding a patent usually decided not to license to small firms in the tranquilizer sector and to include a clause in license contracts - the field of use restriction- preventing licensees from selling a patented drug in bulk. On one hand, licensing to smaller firms could result in price competition and, consequently, lower prices, damaging the large drug manufacturer's competitive position. On the other hand, the inclusion of a field of use restriction, allowing licensees to sell only in finished form, impeded small companies to get access to the bulk material. With this restriction small firms couldn't buy in bulk, tablet and put in bottles, but exclusively to buy at a higher price the finished product. This restrictive clause impeded price competition from smaller firms. This was true only in the institutional market, where the inclusion of field of use restrictions allowed restricting price competition from those firms selling the same drug by its generic name. However, this strategy was not valid in the retail prescription market, where the strategy followed to gain market power was an important expenditure on promotion and marketing. Although there were little patent competition from small firms selling drugs under its generic name, however competition among patented drugs was very relevant.

Those companies selling patented brand-name tranquilizers could hold their market price against a lower price drug sold by its generic name in the retail segment, but they couldn't hold it in a Government or hospitals purchase unless they considerably cut their prices when they bid. In fact, the lowest bid could come from major drug houses supplying a brand-name drug in two occasions: brand-names in this institutional market were purchased when the proprietary drug was one of the few producers available (a negotiated bid) or when the supplier of the proprietary drug was the low bidder.

Comparing prices to the retail druggist with those established under a bid it is clear that bidders supplying a brand-name drug in a competitive bid were forced to cut their prices quite more than in a negotiated bid. The reason is that in this bidding process they competed with many smaller companies making them to reduce the price supplied in the bid[61]. Where little companies manufactured the product, then the price to the Government would be just a sixth or a fifth of what it was to the druggist.

[61] Reserpine was one of the few cases where the company who got the patent licensed anybody who wanted to be licensed, thus, there was price competition. Ciba also allowed the licensees to sell the drug

Although price competition did not exist in the retail prescription market, we however find a strong product rivalry since patented products were often highly substitutable and compete with one another. The way employed by pharmaceutical firms to try to sell their products was not through a lower price but spending a big sum in advertising. The final aim of this promotion was to differentiate a product from those of the competitors. Product competition was a benefit for the society by increasing the speed with which firms develop new drugs, and by introducing more perfect drugs, although not innovative drugs, allowing more options to patients[62].

The high levels of prices for the patented drugs allowed financing selling campaigns due to the great product rivalry although with little or no price difference involved. Since patented products were often highly substitutable and compete with one another, patents did not allow monopoly power without a high selling effort. Therefore, advertising was complementary to innovation: rivalry between identical chemical entities increased substantially the effectiveness of the selling efforts in this industry.

in bulk powder form to small firms which manufactured their own capsules (under their own brand-name or, more frequently, under the generic name).

[62] Lee, 2004

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