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*Pharmaceutical Innovations and
Market Dynamics: Tracking Effects
on Price Indexes for
Antidepressant Drugs*

THE CONSTRUCTION AND PUBLICATION of measures of price inflation are important tasks carried out by governmental statistical agencies. In the United States the Department of Labor's Bureau of Labor Statistics (BLS) publishes price indexes measured at the point of final consumer demand (the consumer price index, CPI) and at the initial transaction

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passage of the 1984 Waxman-Hatch Act.³⁶ By 1996 eighteen or so distributors were offering generic products for each of the TCA drugs facing generic competition, up sharply from about ten in 1988. Not all generic entry has been sustained; although Surmontil faced generic entry in 1988, in 1992 the generic competition exited, and none has emerged since then.

The introduction of Prozac in 1988 marked the entry of an entire new class of antidepressants, the highly successful SSRIs. Other SSRI branded drugs were Zoloft, introduced in 1992, Paxil in 1993, Luvox in 1994, and Serzone in 1995; Effexor, a related product, was also introduced in 1994.

Prices and Market Shares

Next we look at market share and price movements, first among the four classes of antidepressant drugs listed in table 2. During 1980–88 the MAOIs had only a very minor unit and revenue market share, between 1.4 percent and 2.4 percent, and after 1988 this share dropped even further; the 1996 share was but 0.3 percent.

In 1980 the TCAs accounted for about 98 percent of both the daily dosage quantities sold and total antidepressant revenues. By 1987 the TCA unit share fell slightly, to 90 percent, as trazodone (from a different class of drugs) increased its unit market share to about 8 percent; the corresponding TCA revenue shares were 77 percent and 21 percent. Among the TCAs, three dominated in 1980: amitriptyline had a 50 percent unit share, doxepin 22 percent, and imipramine 18 percent, for a combined share of 90 percent. By 1987 this combined share fell to 80 percent, as sales of products such as desipramine, amoxapine, and nortriptyline (having fewer and less severe side effects—see table 1) increased to a combined 14 percent unit share. The three largest TCAs accounted for about 82 percent of total TCA dollar sales in 1980, but only 49 percent in 1987, in large part because all three products faced increased generic competition in the 1980s.

The launching of Prozac was a huge success. Not only did this first SSRI take market share away from the TCAs, but it also expanded enormously the size of the overall antidepressant drug marketplace.

36. For discussion of this legislation and its consequences, see Grabowski and Vernon (1992).

General practitioners and internists, not just psychiatrists, were now able to prescribe antidepressants comfortably, for concerns about side effects and adverse interactions with Prozac were much less intense than with the TCAs. Moreover, because the daily dosage for Prozac was the same for almost everyone, specialist knowledge and experience concerning optimal patient-specific dosages, typically required for many of the TCA drugs, were no longer necessary. At the end of its first year on the market (1988), the Prozac daily dosage share among all antidepressants was 11 percent, and given its higher price, its dollar market share was 21 percent; by 1991 these shares had increased to 29 percent and 51 percent, respectively.

The SSRI market continued to grow rapidly following entry by additional SSRIs, and by 1996 the SSRI market share among all antidepressants was 63 percent in daily dosage units and a remarkable 84 percent in dollars; unit market shares for the TCAs fell from 90 percent in 1987 to 27 percent in 1996, while revenue shares dropped even more dramatically, from 77 percent to 7 percent. Clearly, for many physicians and patients dealing with the treatment of depression, the SSRIs were enormously successful in fulfilling unmet needs.

Within the SSRI subclass of drugs, unit sales of Prozac continued to grow, from 340 million daily units in 1991 to 645 million in 1995. But the great success of Zoloft and Paxil in expanding the overall SSRI market has implied a loss in Prozac's market share; in 1996 SSRI daily dosage market shares for Prozac, Zoloft, and Paxil were 41.6 percent, 41.5 percent, and 12.6 percent, respectively, while corresponding dollar market shares were 48.0 percent, 29.8 percent, and 17.8 percent. Moreover, the unit shares of Prozac, Zoloft, and Paxil prescriptions written by nonpsychiatrists were 39 percent, 51 percent, and 49 percent, respectively, indicating proportionally more nonspecialist prescriptions written for Zoloft and Paxil than for Prozac.³⁷

Prozac and other SSRI entrants have been tremendously successful despite their higher daily dosage prices. When Prozac was launched in 1988, for example, its daily price was about \$1.18, almost double the \$0.60 daily price of the branded version of the leading selling tricyclic, amitriptyline, and more than twenty times the \$0.05 daily price for generic versions of that chemical entity; doxepin, the second best-

37. IMS (1996a).

selling tricyclic, was also much cheaper than Prozac—\$0.70 a day in its branded version and \$0.21 in generic form. When Zoloft, the second SSRI entrant, was launched in 1992, its daily price was set at about 25 percent lower than that of Prozac—\$1.26 compared with \$1.69. Serzone, the most recent SSRI, is priced in between Prozac and Zoloft.

In constructing a price index, what happens following entry of generic competition is very important.³⁸ In table 3 we summarize price and market share developments at twelve, twenty-four, and thirty-six months following initial generic entry for the seven chemical entities experiencing initial generic competition since 1980. The top panel shows that although considerable variability is present, unweighted average generic prices are about 57 percent, 43 percent, and 35 percent of brand prices after one, two, and three years.³⁹ Substantial differences in market share penetration are also present. Measured in daily units, generic market shares vary from 5 percent to 68 percent of brand shares after one year and average about 27 percent, while they average about 44 percent and 54 percent after two and three years, respectively.

There does not appear to be any dominant time trend to generic penetration rates, although the market share of the most recent generic entrant, nortriptyline, is the largest after one, two, and three years. Because generic prices are lower than brand prices, dollar shares are smaller than unit shares; even so, after just one year the nortriptyline dollar share is 56 percent.

The generic price can fall relative to the brand price if the generic price decreases, the brand price increases, or both. As the second panel of table 3 shows, manufacturers have tended to increase the price of branded products following generic entry, apparently focusing on the price inelastic market segment and letting generics gain market share from the elastic segment; after one, two, and three years, the average

38. For discussion of generic pricing and responses by incumbents, see Caves, Whinston, and Hurwitz (1991); Frank and Salkever (1992); Grabowski and Vernon (1992); Griliches and Cockburn (1994); Hurwitz and Caves (1988); and Masson and Steiner (1985).

39. These trends in prices of generic drugs for treatment of a relatively chronic condition such as depression differ considerably from those reported by Griliches and Cockburn (1994) for systemic infectives, which tend to be used in the treatment of more acute conditions. For generic antidepressants (except nortriptyline), the initial price discount is larger, but after that the relative price is flatter than that of generic systemic anti-infectives.

Table 3. Relative Prices and Market Share Penetration of Generic Antidepressant Drugs Introduced since 1986
 Twelve, Twenty-four, and Thirty-six Months after Introduction

Chemical entity	Entry year	Relative price generic to brand			Generic market share in units			Generic market share in dollars		
		12	24	36	12	24	36	12	24	36
doxepin	1986	38	30	25	39	54	67	20	26	34
trazodone	1986	62	42	18	23	44	70	16	25	29
desipramine	1987	61	37	31	29	61	58	20	37	30
maprotiline	1988	61	54	42	10	22	33	6	13	17
trimipramine	1988	60	53	58	5	11	11	3	6	7
amoxapine	1989	58	51	50	14	37	51	9	23	35
nortriptyline	1992	61	36	22	68	80	85	56	58	56

Chemical entity	Pioneer brand price after generic entry (Generic entry date = 1.00)			Real GDP-deflated price		
	Nominal price per day			Real GDP-deflated price		
	12	24	36	12	24	36
doxepin	1.11	1.35	1.50	1.08	1.27	1.35
trazodone	1.01	1.22	1.58	0.98	1.14	1.42
desipramine	1.13	1.35	1.60	1.09	1.25	1.42
maprotiline	1.14	1.21	1.28	1.08	1.11	1.12
trimipramine	1.14	1.23	1.43	1.09	1.12	1.25
amoxapine	0.97	1.39	1.45	0.94	1.33	1.29
nortriptyline	1.04	1.06	1.11	1.01	1.01	1.05

Source: IMS America, Inc.

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