

TABLE 4. AVERAGE BEST-PRICE DISCOUNTS, 1991-1994 (In percent)

Year	Quarter	All Drugs		Top 100 Drugs, Unweighted
		Weighted	Unweighted	
1991	1	36.7	42.1	35.1
	2	35.8	41.7	34.1
	3	35.4	41.1	33.6
	4	35.0	39.5	33.2
1992	1	27.8	37.7	27.8
	2	26.7	36.7	27.8
	3	28.2	36.9	27.8
	4	24.9	33.4	24.7
1993	1	20.2	29.2	18.8
	2	20.2	28.5	18.5
	3	19.8	26.3	18.5
	4	19.9	25.7	18.8
1994	1	18.5	25.0	18.8
	2	19.3	25.2	19.3

SOURCE: Congressional Budget Office based on data collected by the Health Care Financing Administration on the Medicaid rebate program.

The existence of a ceiling in the first year gave firms a grace period to adjust to the new rebate program. Firms in some instances could have been locked in to low price levels through contracts with private purchasers. The small change in discounts during the first year of the program is consistent with the results of a General Accounting Office report. That report found that the year after the Omnibus Budget Reconciliation Act was enacted, there was not a dramatic increase in the prices paid for outpatient drugs by the health maintenance organizations and hospital group purchasing organizations GAO surveyed.<sup>3</sup>

The decline in the average best-price discounts nearly leveled off in 1993 and 1994, and a slight upturn took place in the second quarter of 1994. Manufacturers appear to have finished responding to the incentives created by the best-price provision. The average best-price discount probably will not decline any further as a result of the current Medicaid rebate regulations. If Medicaid was reformed through

3. General Accounting Office, *Medicaid: Changes in Drug Prices Paid by HMOs and Hospitals Since Enactment of Rebate Provisions*, GAO/HRD-93-43 (January 1993).

block grants, however, some states might choose to cut back on prescription drug benefits since the resulting savings would fully accrue to the states. If the share of purchases made by Medicaid in the prescription drug market was to decline, so would the impact of the rebate program on drug pricing.

The average best discount on the top-selling drugs for Medicaid is lower than the average best discount on all drugs. For example, in the first quarter of 1991 the average best discount (unweighted) on all drugs was 42 percent, whereas the average best discount on the top-selling drugs in the sample was 35 percent. The average discount on those top-selling drugs also declined substantially between 1991 and 1993, falling from 35 percent in the first quarter of 1991 to 19 percent in the first quarter of 1993. The impact of the Medicaid rebate on the discounts offered on the top-selling drugs is important because those drugs constitute a large portion of rebate payments as well as of private-sector expenditures.

The best-price discounts on both single-source and multiple-source innovator drugs declined substantially between 1991 and 1994. The average best discount for multiple-source innovator drugs in the first quarter of 1991 was 51 percent, whereas for single-source drugs the average was just 35 percent (see Figure 4). By the second quarter of 1994, the average best-price discount on multiple-source innovator drugs fell to 32 percent, a drop of 19 percentage points from its 1991 level. The average best discount on single-source drugs fell to 21 percent, a decline of 14 percentage points.

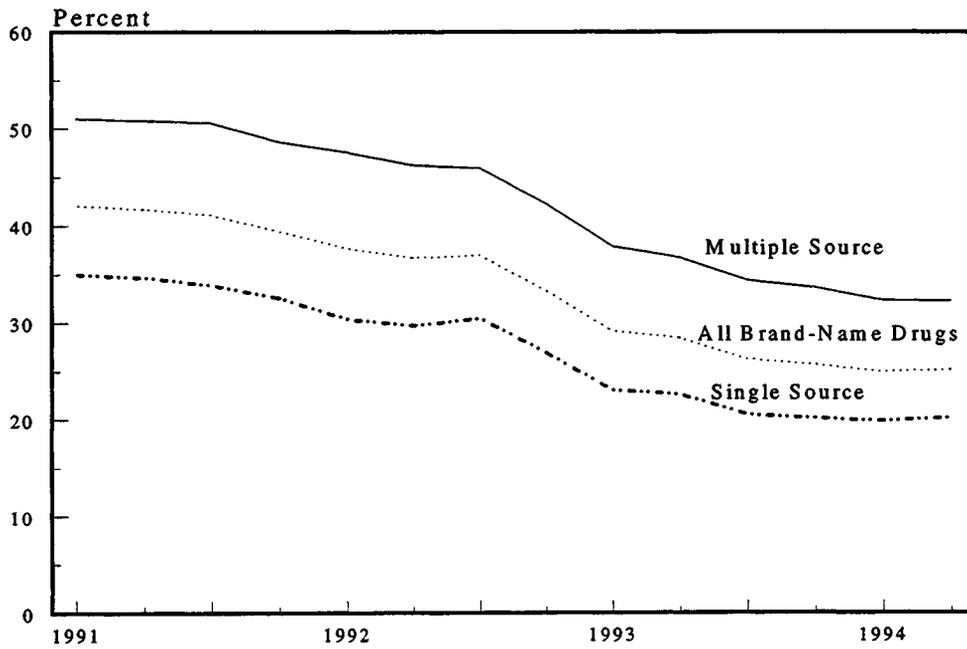
#### Change in the Distribution of Best-Price Discounts

The Medicaid rebate had a large impact on the pricing of those drugs that were most heavily discounted in 1991. For example, large discounts off the AMP became much less common. In the first quarter of 1991, 40 percent of the best discounts exceeded 50 percent off the AMP. By the second quarter of 1994, only 17 percent of the best discounts exceeded 50 percent off the AMP.

CBO examined how the distribution of best-price discounts changed between 1991 and 1994 (see Figure 5). In 1991, the best-price discounts were more evenly spread out, with as many drugs being discounted between 80 percent and 90 percent as were discounted between 10 percent and 20 percent. By 1994, a clear pattern emerged in which most of the best discounts were concentrated in the lower ranges. In the first quarter of 1991, only one-third of the best discounts were less than 20 percent off the AMP. Yet by 1994, 56 percent of the best discounts were less than 20 percent off the AMP.

The change in the distribution of best-price discounts on single-source drugs is even more dramatic (see Figure 6). In 1991, one-third of single-source drugs had

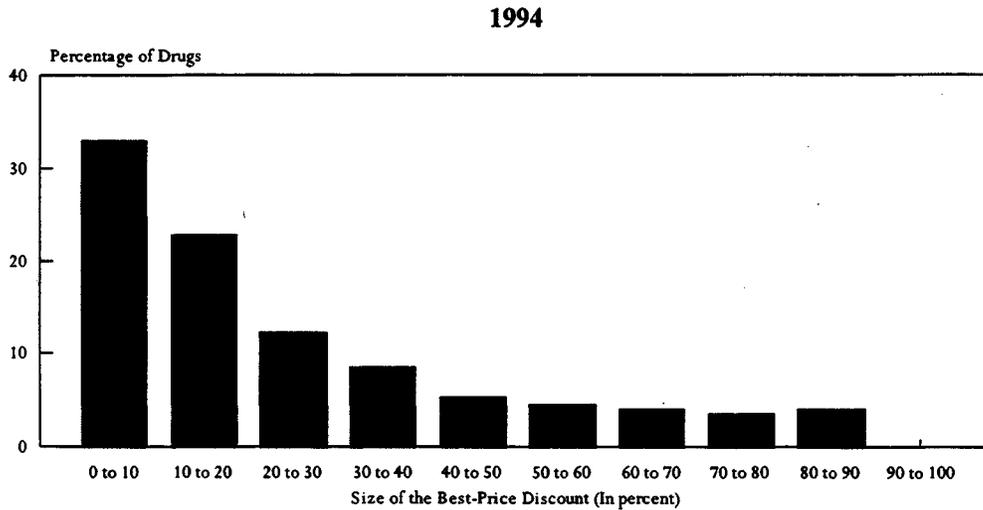
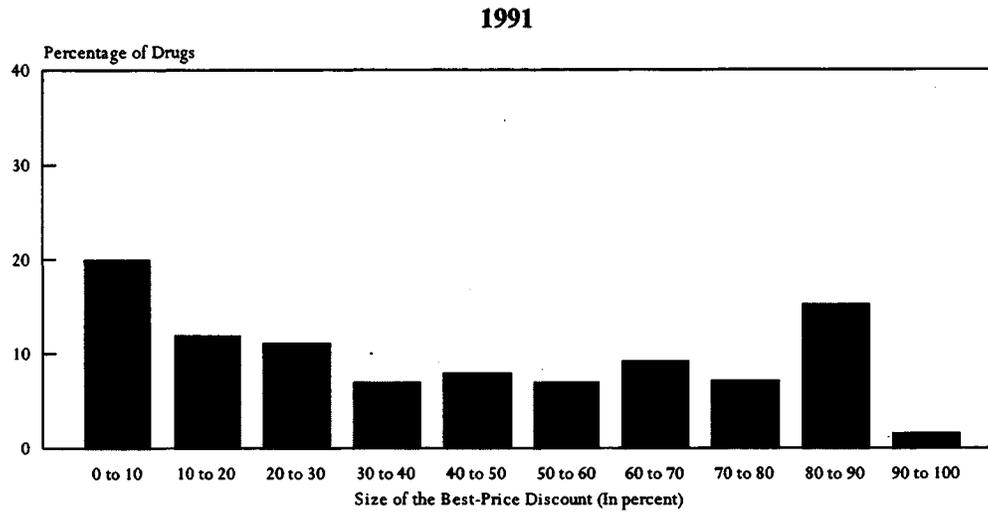
FIGURE 4. UNWEIGHTED AVERAGE BEST-PRICE DISCOUNTS, 1991-1994



SOURCE: Congressional Budget Office based on data collected by the Health Care Financing Administration on the Medicaid rebate program.

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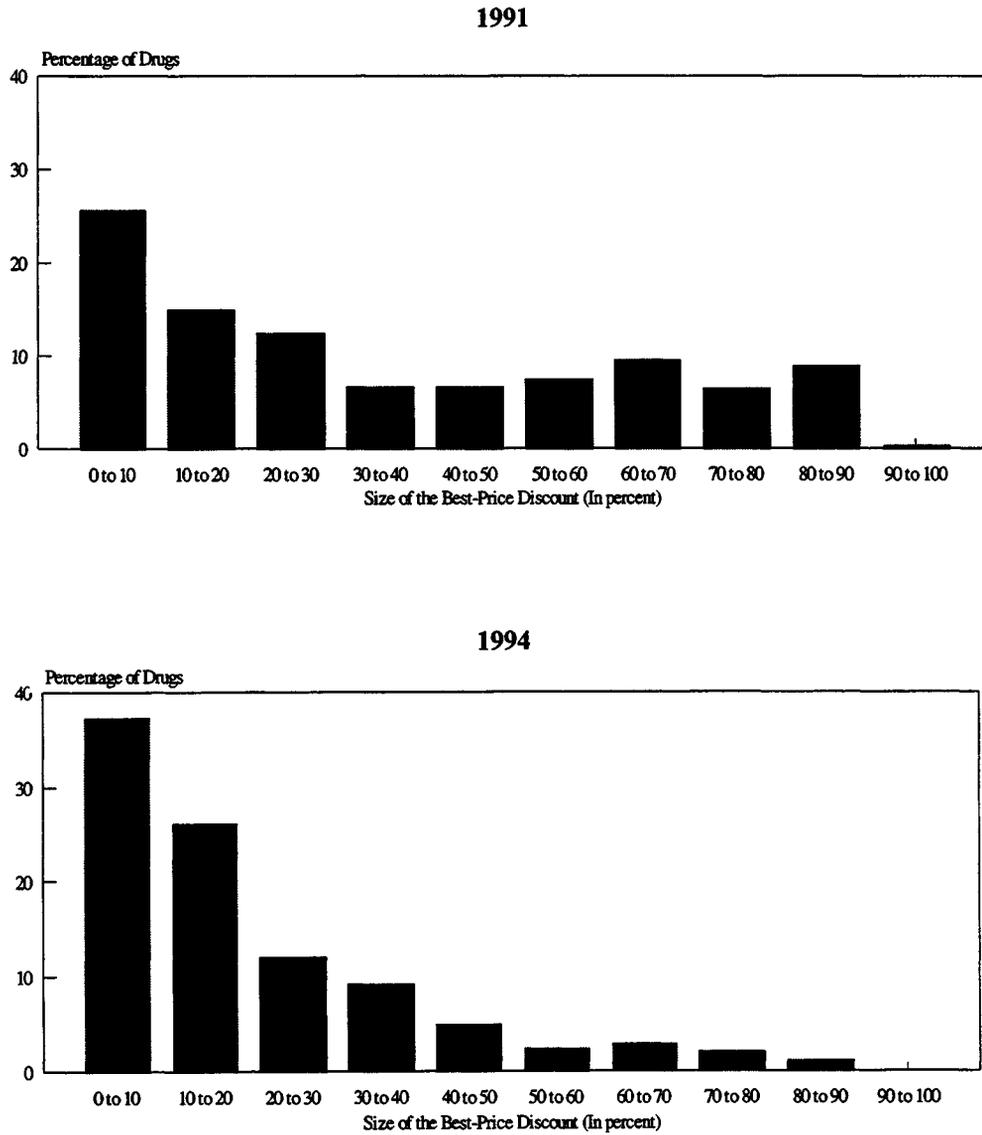
FIGURE 5. DISTRIBUTION OF BEST-PRICE DISCOUNTS FOR ALL BRAND-NAME DRUGS



SOURCE: Congressional Budget Office based on data collected by the Health Care Financing Administration on the Medicaid rebate program.

NOTE: Manufacturers are not required to report those prices equal to or less than 10 percent of the average manufacturer price (AMP). Hence, best-price discounts as high as 90 percent off the AMP are rarely recorded.

FIGURE 6. DISTRIBUTION OF BEST-PRICE DISCOUNTS FOR SINGLE-SOURCE DRUGS



SOURCE: Congressional Budget Office based on data collected by the Health Care Financing Administration on the Medicaid rebate program.

NOTE: Manufacturers are not required to report those prices equal to or less than 10 percent of the average manufacturer price (AMP). Hence, best-price discounts as high as 90 percent off the AMP are rarely recorded.

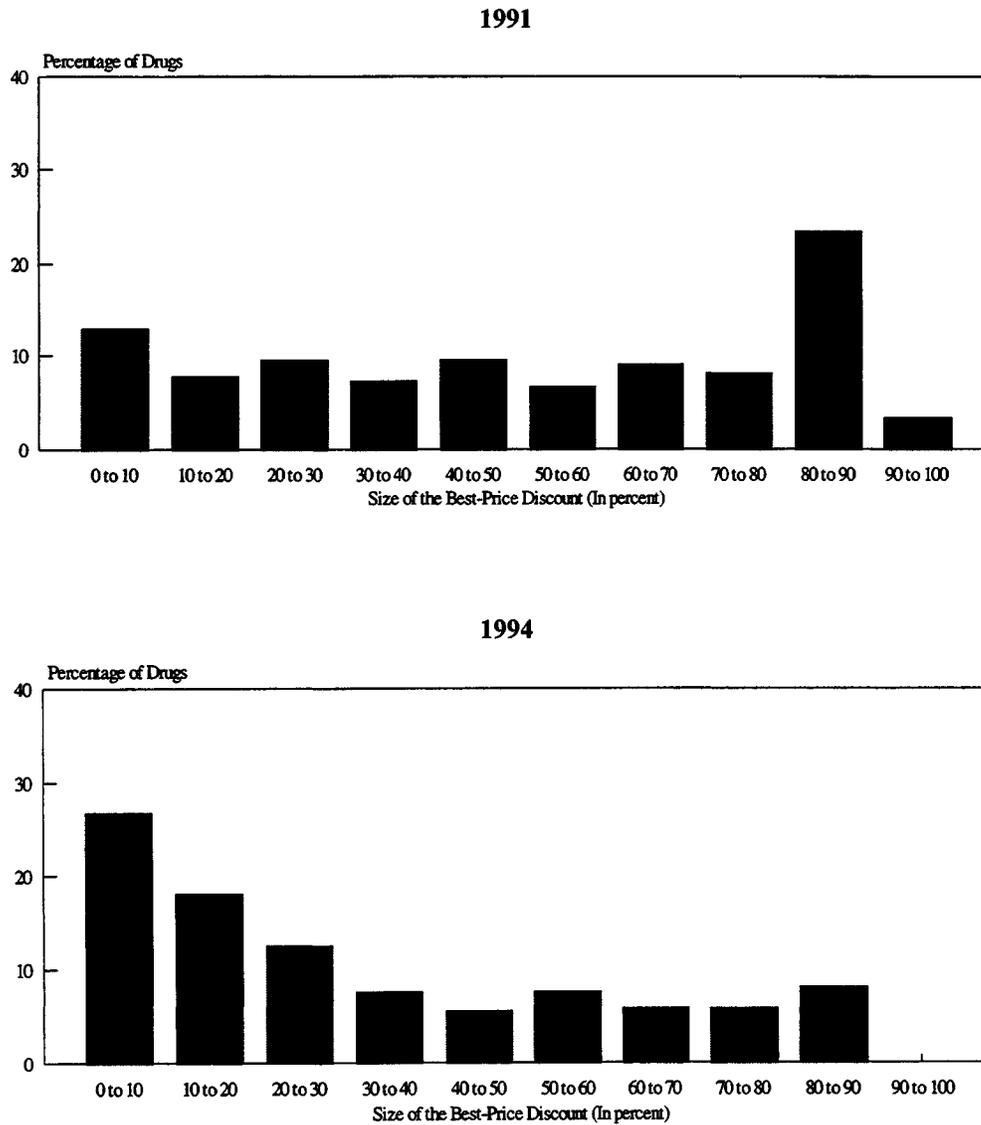
best-price discounts in excess of 50 percent. By 1994, best-price discounts were much more concentrated in the lower ranges with only 9 percent of single-source drugs having best discounts above 50 percent. In 1991, just over half of the single-source drugs had discounts of 30 percent or less. By 1994, three-quarters of the single-source drugs had discounts of 30 percent or less. Single-source drugs constitute two-thirds of Medicaid reimbursements. They also constitute roughly the same proportion of U.S. sales; most top-selling drugs are single-source drugs. Therefore, the changing best-price discounts on those drugs can have a large impact on both Medicaid rebate revenues and prescription drug expenditures of private purchasers that negotiate discounts.

Half of all innovator multiple-source drugs had discounts of over 50 percent in 1991. By 1994, only 28 percent of innovator multiple-source drugs had discounts in that range. As Figure 7 shows, a shift toward lower best-price discounts took place between 1991 and 1994 for multiple-source drugs as well, though it was much less pronounced than for single-source drugs. Innovator multiple-source drugs constitute just 10 percent of Medicaid reimbursements. The changes in the best prices of multiple-source drugs may have had a smaller effect on the expenditures of private purchasers because there is often an option to substitute a generic drug. In fact, manufacturers frequently offer higher discounts on innovator multiple-source drugs because those drugs face generic competition.

The best-price provision creates an incentive for firms to lower their best-price discounts to the level of the minimum rebate (15.1 percent in 1996). It does not, however, change the incentives to offer no discounts or to offer very low discounts. The proportion of single-source drugs with best-price discounts between 5 percent and 15 percent doubled between 1991 and 1994—by 1994, 30 percent of single-source drugs had best-price discounts in that range (see Figure 8). At the same time, the proportion of single-source drugs with discounts in excess of 20 percent declined from 59 percent in 1991 to 36 percent by 1994. That change in the distribution of discounts for single-source drugs, which constitute 68 percent of Medicaid expenditures on outpatient prescription drugs, is in part a response to the incentives created by the Medicaid rebate.

Surprisingly, for 30 percent of the drugs in the sample, the best-price discounts were higher in 1994 than in 1991 (see Table 5). However, for over two-thirds of those drugs, the best-price discount increased only because the AMP rose more rapidly than the best price, not because the best price itself declined. The average best-price discount for single-source drugs in this group rose from 17 percent in 1991 to 26 percent in 1994. That evidence suggests that the best-price provision has not eliminated the incentive for manufacturers to give discounts of more than 15 percent in order to increase market share.

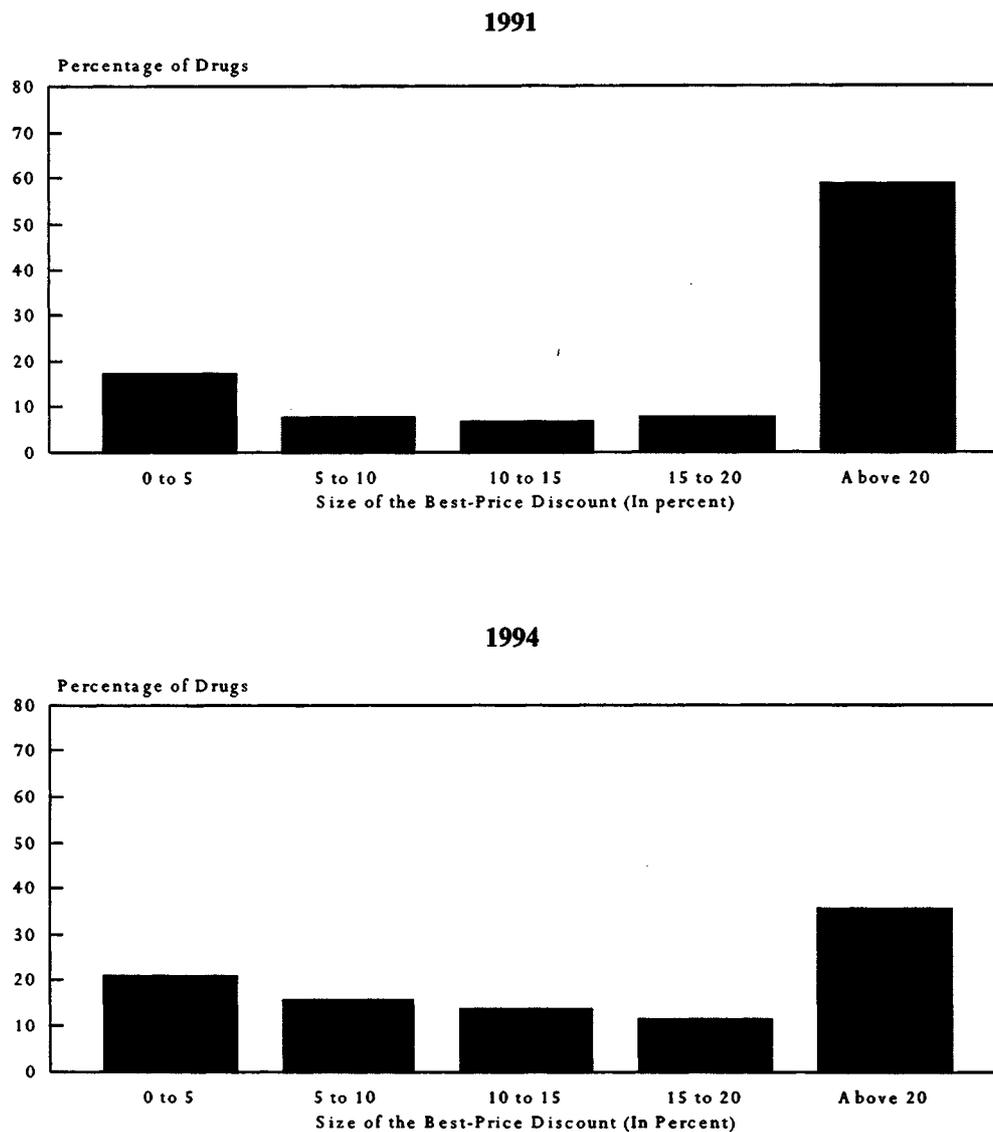
FIGURE 7. DISTRIBUTION OF BEST-PRICE DISCOUNTS FOR MULTIPLE-SOURCE DRUGS



SOURCE: Congressional Budget Office based on data collected by the Health Care Financing Administration on the Medicaid rebate program.

NOTE: Manufacturers are not required to report those prices equal to or less than 10 percent of the average manufacturer price (AMP). Hence, best-price discounts as high as 90 percent off the AMP are rarely recorded.

FIGURE 8. BEST-PRICE DISCOUNTS FOR SINGLE-SOURCE DRUGS



SOURCE: Congressional Budget Office based on data collected by the Health Care Financing Administration on the Medicaid rebate program.

NOTE: Manufacturers are not required to report those prices equal to or less than 10 percent of the average manufacturer price (AMP). Hence, best-price discounts as high as 90 percent off the AMP are rarely recorded.

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TABLE 5. HOW BEST-PRICE DISCOUNTS CHANGED BETWEEN 1991 AND 1994

Percentage-Point Difference Between Best-Price Discounts in 1991 and 1994	Percentage of Brand-Name Drugs		
	All	Single Source	Multiple-Source Innovators
Lower in 1994 by			
0 to 10	25	26	23
10 to 20	14	14	13
20 to 30	8	7	9
Over 30	24	22	27
Greater in 1994	30	31	28

SOURCE: Congressional Budget Office based on data collected by the Health Care Financing Administration on the Medicaid rebate program.

The best-price discount is only an indicator of the level of discounting that occurs with a given drug. Purchasers that negotiate discounts with pharmaceutical companies can receive anything from a small discount off the AMP up to the best-price discount. If the best-price discount on a drug declines from 50 percent to 30 percent, any purchaser that received a discount in excess of 30 percent is affected.

The best-price discounts of 24 percent of all drugs in the sample declined by 30 percentage points or more between 1991 and 1994 (see Table 5). Moreover, such dramatic declines in best-price discounts were not confined to multiple-source drugs. The best-price discounts of 22 percent of the single-source drugs declined by at least 30 percentage points between 1991 and 1994. Although probably only a small number of purchasers have access to the best-price discounts, many more purchasers may obtain a discount within 30 percentage points of the best-price discount.

### Price Changes

CBO created two price indices to assess the change in both the AMPs and the best prices (see Table 6). The drugs purchased in 1993 by Medicaid beneficiaries were used as the basket of goods to create the price indices. Despite the additional rebate, the AMP price index increased by 14.8 percent between 1991 and 1994; the rate of inflation over the same period, as measured by the consumer price index for all urban consumers (CPI-U), was 8.6 percent. During 1991, the percentage increase in the AMP index was more than twice that of the CPI-U (6.7 percent compared with 2.6 percent), which is roughly in line with the experience of the producer price index

TABLE 6. PERCENTAGE CHANGE IN PRICE INDEXES, 1991-1994

Time Period <sup>a</sup>	Index for Best Prices <sup>b</sup>	Index for Average Manufacturer Prices <sup>b</sup>	Producer Price Index for Pharmaceuticals	Consumer Price Index
1991 to 1992	14.6	6.7	7.7	2.6
1992 to 1993	12.6	4.5	5.0	3.3
1993 to 1994	3.9	3.0	3.6	2.5
Total, 1991 to 1994	34.1	14.8	17.2	8.6

SOURCE: Congressional Budget Office based on data collected by the Health Care Financing Administration on the Medicaid rebate program. The fourth and fifth columns are from the Department of Commerce, Bureau of Labor Statistics.

a. Based on data from the first quarter of each year.

b. Based on the quantities of single-source and innovator multiple-source drugs purchased by Medicaid beneficiaries in 1993.

(PPI) for pharmaceuticals before the Medicaid rebate program (see Table 7). Between 1985 and 1991, the PPI for pharmaceuticals increased each year by at least 8 percent whereas the CPI-U never increased by more than 5.4 percent. Viewed in that context, the percentage increase in the AMP index in 1991 was not unusual. After 1991, the percentage increase in the AMP index was much closer to the percentage increase in the CPI-U.

The change in the best-price index far exceeded the change in the AMP index. Between 1991 and 1994, the best-price index rose by 34 percent--over twice the percentage change in the AMP price index (see Table 6). That result confirms that the difference between best prices and AMPs was narrowing over this period largely because the best prices were rising. Most of the increase in the best-price index occurred during the first two years that the Medicaid rebate program was in effect. During 1993, the percentage increase in the best-price index was very close to the percentage increase in the producer price index for pharmaceuticals. Evidently, by 1993 manufacturers had largely adjusted to the incentives created by the best-price provision.

TABLE 7. ANNUAL CHANGE IN THE PRODUCER PRICE AND CONSUMER PRICE INDEXES, 1974-1994 (In percent)

Year	PPI for Pharmaceuticals	PPI for All Products	Consumer Price Index
1971	-0.2	3.1	4.4
1972	0	3.2	3.2
1973	1.0	9.1	6.2
1974	4.2	15.4	11.0
1975	8.6	10.6	9.1
1976	6.4	4.5	5.8
1977	4.1	6.4	6.5
1978	5.2	7.9	7.6
1979	7.1	11.2	11.3
1980	8.9	13.4	13.5
1981	11.7	9.2	10.3
1982	11.1	4.1	6.2
1983	10.7	1.6	3.2
1984	9.2	2.1	4.3
1985	9.2	1.0	3.6
1986	8.8	-1.4	1.9
1987	9.1	2.1	3.6
1988	7.9	2.5	4.1
1989	9.1	5.2	4.8
1990	8.9	4.9	5.4
1991	8.3	2.1	4.2
1992	6.5	1.2	3.0
1993	4.5	1.2	3.0
1994	3.2	0.6	2.6

SOURCE: Bureau of Labor Statistics and the *Economic Report of the President, 1995*.

NOTE: PPI = producer price index.

### CHANGES IN THE AVERAGE BASIC REBATE BETWEEN 1991 AND 1994

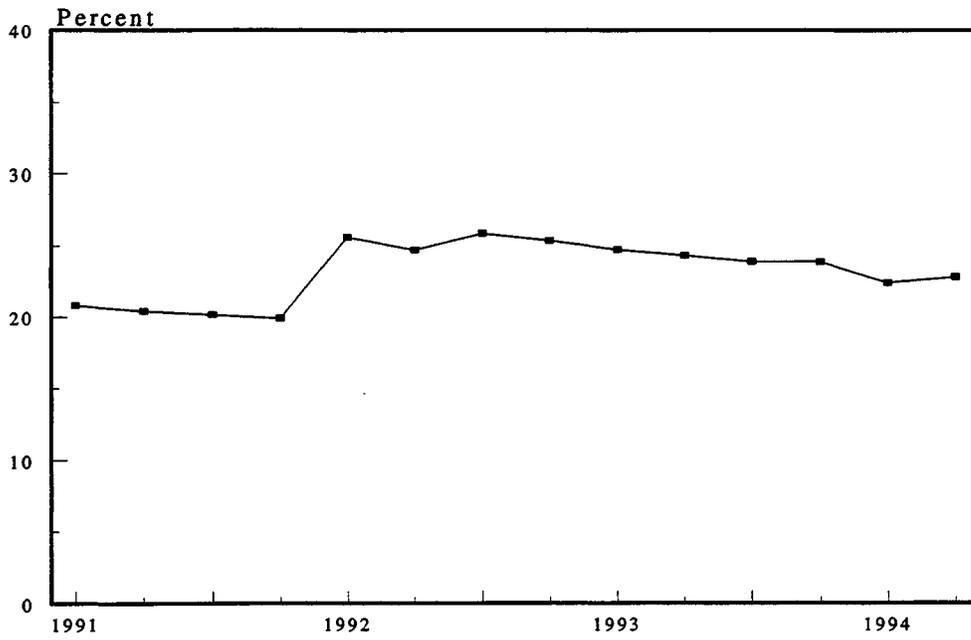
Firms responded to the incentives created under the Medicaid rebate program by lowering their best-price discounts. As a result, the Medicaid rebates paid today are lower than they would be if firms had left their discounts at the higher 1991 levels (see Figure 9 for the average basic rebate, weighted by sales, in each quarter from 1991 to 1994). The basic rebate is equal to a flat percentage of the AMP (15.4 percent in 1994) or to the difference between the AMP and the best price, whichever is greater. The best-price provision increased the basic rebate from the flat 15.4 percent to 22.8 percent of AMP on average in 1994 (see Table 8). CBO estimates that if best-price discounts were still at 1991 levels, the weighted average basic rebate in 1994 would have been much higher—38.6 percent. Therefore, the decline in best-price discounts since 1991 lowered the average basic rebate by almost 16 percentage points in 1994. The decline in the average basic rebate appears to have leveled off in 1994.

Although no cap on the basic rebate existed in 1994, the amount by which the best-price provision increased the basic rebate was no larger in 1994 than in 1991, when there was a cap of 25 percent. The best-price provision increased the average basic rebate paid by 7 to 8 percentage points in both 1991 and 1994. Thus, the decline in best-price discounts since 1991 has limited the contribution of the best-price provision to the average basic rebate. In fact, by 1994 less than 30 percent of the average basic rebate could be attributed to the best-price provision.

The contribution of the best-price provision to the average rebate was highest in 1992 when the cap was increased from 25 percent to 50 percent. Similarly, the average basic rebate was highest in 1992. As a result of the 25 percent cap in 1991, the average basic rebate was just 20 percent to 21 percent of the AMP. In 1992, the ceiling was increased to 50 percent and as a result the average basic rebate rose to about 25 percent of the AMP.

In two instances, declining best-price discounts offset changes that would have increased the basic rebate. In the fourth quarter of 1992, the flat rebate increased by over 3 percentage points (from 12.5 percent to 15.7 percent), but the average basic rebate was less than 1 percentage point higher than in the second quarter. (The third quarter cannot be used as a comparison because of the temporary change in the rule regarding FSS prices.) The decline in best-price discounts had offset much of the increase in the flat rebate. In 1993, the ceiling on the basic rebate was lifted entirely. The flat rebate was still 15.7 percent, 3 percentage points higher than in early 1992. The average basic rebate, however, was no higher in 1993 than in early 1992. Manufacturers had lowered their best-price discounts enough in 1993 to offset the effect of the higher flat rebate and the repeal of the ceiling.

FIGURE 9. WEIGHTED AVERAGE BASIC REBATE, 1991-1994



SOURCE: Congressional Budget Office based on data collected by the Health Care Financing Administration on the Medicaid rebate program.

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TABLE 8. CHANGES IN THE AVERAGE BEST-PRICE DISCOUNT AND BASIC REBATE BETWEEN 1991 AND 1994 (In percent)

Year	Quarter	Weighted Average Best-Price Discount	Basic Rebate		Average Contribution of Best-Price Provision to Basic Rebate
			Weighted Average	Minimum	
1991	1	36.7	20.8	12.5	8.3
	2	35.8	20.4	12.5	7.9
	3	35.4	20.2	12.5	7.7
	4	35.0	19.9	12.5	7.4
1992	1	27.8	25.6	12.5	13.1
	2	26.7	24.7	12.5	12.2
	3	28.2	25.9	12.5	13.4
	4	24.9	25.4	15.7	9.7
1993	1	20.2	24.7	15.7	9.0
	2	20.2	24.3	15.7	8.6
	3	19.8	23.9	15.7	8.2
	4	19.9	23.8	15.7	8.1
1994	1	18.5	22.4	15.4	7.0
	2	19.3	22.8	15.4	7.4

SOURCE: Congressional Budget Office based on data collected by the Health Care Financing Administration on the Medicaid rebate program.

The decline of the best-price discounts between 1991 and 1994, in part because of the Medicaid rebate program, comes as no surprise to policymakers. Indeed, CBO accounted for a decline in best-price discounts when it estimated the anticipated savings from the Medicaid rebate program.

## **CHAPTER V**

### **OPTIONS FOR CHANGING THE BEST-PRICE PROVISION**

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The Congressional Budget Office examined two alternatives that could reduce the interference of the Medicaid rebate with discounting, while having a very small impact on the total savings obtained under the Medicaid rebate. One alternative is to repeal the best-price provision and compensate for the loss in savings by raising the minimum rebate. A second option is to place a cap on the basic rebate.

For the first alternative, CBO estimates that repealing the best-price provision would be budget neutral in 1996 if at the same time the minimum rebate was increased from 15.1 percent to 22.6 percent. Whether such an increase could itself affect pricing is discussed below. The minimum basic rebate in 1996 and thereafter is 15.1 percent. CBO calculated that the weighted average basic rebate in 1994 would have been 22.6 percent if the minimum rebate at that time had been 15.1 percent. Any option that maintained an estimated weighted average basic rebate of 22.6 percent in 1996 and beyond would be approximately budget neutral. Those estimates do not account for any change in best-price discounts that might occur as manufacturers responded to changes in the best-price provision.

The second alternative—a cap combined with an increase in the minimum rebate—could also maintain budget neutrality. Since capping the basic rebate is a more gradual step than repealing the best-price provision, it would require a smaller compensating increase in the minimum rebate. A 50 percent cap on the basic rebate combined with an increase in the minimum rebate from 15.1 percent to 16.7 percent would be budget-neutral in 1996 (see Table 9).

The two options are designed to reduce the impact of the best-price provision on the incentive of firms to offer steep discounts without reducing the savings the federal government obtains through the Medicaid rebate. Eliminating the best-price provision would require more than a 7 percentage-point increase in the minimum rebate to maintain budget neutrality. Alternatively, capping the basic rebate would limit the impact of the best-price provision on discounting and require a smaller increase in the minimum rebate to maintain budget neutrality.

A cap would reduce the basic rebate only in those instances in which the best-price discount exceeded the cap. CBO calculates that a 50 percent cap would reduce the average basic rebate by about 1 percentage point, and a 40 percent cap would reduce the weighted average basic rebate by about 2 percentage points.

The lower the cap, the higher the required increase would be in the minimum rebate to maintain budget neutrality. For instance, a cap of 40 percent on the basic rebate would require an increase in the minimum rebate from 15.1 percent to 18 percent to maintain budget neutrality. A 70 percent cap would require less than a 0.5 percentage-point increase in the minimum rebate to maintain budget neutrality. Since few best-price discounts are as high as 70 percent, such a high cap would not have a big effect on rebate revenues or on discounting. Conversely, a cap as low as 30 percent would require a much larger increase in the minimum rebate to be budget neutral because many more best-price discounts exceed that amount.

When the cap is as low as 30 percent, the difference between the cap and the minimum rebate required for budget neutrality is small--just 10 percentage points. As the gap between the minimum rebate and the cap narrows, the option begins to resemble a repeal of the best-price provision accompanied by a higher minimum rebate of 22.6 percent.

In response to a cap on the basic rebate, firms could raise some of their best discounts that already exceeded the level of the cap. Firms could also increase the level of best discounts that were just under the cap. A cap limits the extent to which the Medicaid rebate increases the cost of giving some customers large discounts. That limit on the basic rebate would benefit a number of private-sector purchasers if firms were to raise some of their discounts as a result.

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TABLE 9. THE EFFECT OF COMBINING A CAP ON THE BASIC REBATE WITH A HIGHER MINIMUM REBATE TO MAINTAIN BUDGET NEUTRALITY (In percent)

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Cap on the Basic Rebate	Minimum Rebate Required for Budget Neutrality <sup>a</sup>
70	15.4
60	15.9
50	16.7
40	18.0
30	20.0

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SOURCE: Congressional Budget Office calculations based on data collected by the Health Care Financing Administration on the Medicaid rebate program.

a. The minimum rebate in 1996 and thereafter is 15.1 percent. These options are budget neutral for 1996 and beyond.

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A repeal of the best-price provision would require about a 7 percentage-point increase in the minimum rebate to maintain budget neutrality. Such a large increase in the minimum rebate could affect the average manufacturer price. However, the additional rebate would limit the extent to which manufacturers could compensate for an increase in the minimum rebate by raising the AMP.

Firms could partially offset an increase in the minimum rebate by charging higher launch prices for new drugs. However, for drugs already on the market, an increase in the minimum rebate could cause manufacturers to raise their AMP only in instances in which they were charging less than the price that maximizes profits. If firms were already charging the profit-maximizing AMP, then increasing the AMP further would not increase profits on non-Medicaid sales. Moreover, the additional rebate would prevent a price increase from raising unit revenues on Medicaid sales.

Hence, if firms were already charging the profit-maximizing AMP, they could not compensate for an increase in the minimum rebate by raising the AMP. However, there may be some markets, particularly for new and unique drugs, in which firms face no close competitors and could profitably charge higher prices, but do not. Public opinion may limit prices in those instances. If such markets exist, firms in them could compensate for an increase in the minimum rebate by slightly raising their prices.

Another alternative to the Medicaid rebate (though not examined by CBO) would be to encourage Medicaid beneficiaries to enroll in health maintenance or other managed care organizations that can negotiate their own discounts with manufacturers. In a few states, that alternative is already happening. By the end of 1994, eight states had obtained demonstration waivers from statutory Medicaid requirements from the Health Care Financing Administration to help them move many of their Medicaid beneficiaries into managed care organizations.<sup>1</sup> Most of those states have turned over the prescription drug benefit to the managed care organizations (or plan to), in which case the Medicaid rebate does not apply. But those organizations are free to negotiate their own discounts with manufacturers.<sup>2</sup>

Substantial reforms to the Medicaid program were included in the Balanced Budget Act passed by the Congress in November 1995. Although the President vetoed the act, subsequent budget legislation may include similar reforms to Medicaid. The act would turn full responsibility for Medicaid over to the states and continue federal support through block grants. In short, the direct link between state expen-

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1. Those eight states are Arizona, Florida, Hawaii, Kentucky, Oregon, Rhode Island, South Carolina, and Tennessee. Seven additional states are seeking waivers for that purpose. See Mark Merlis, *Medicaid: Program and Demonstration Waivers*, 95-109 EPW (Congressional Research Service, December 23, 1994).

2. Personal communication with Sidney Trieger, Office of Research Demonstrations, Health Care Financing Administration, August 21, 1995.

ditures and federal funding would be broken, but the Medicaid rebate program would be left intact. However, the rebate savings would no longer be shared by the federal government; instead, they would belong entirely to the states. Under such a reform of Medicaid, the options proposed above would be budget neutral for the states, since changes in the rebate formula would no longer affect the federal budget.

If the Medicaid program was reformed through block grants, the savings that could be obtained from reducing Medicaid prescription drug coverage would accrue entirely to the states. As a result, some states might choose to reduce the number of people eligible for drug benefits under Medicaid or eliminate those benefits entirely. If Medicaid's market share was to decline significantly, the impact of the rebate program on drug pricing would diminish.

## **APPENDIX**

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### **PRICE DISCRIMINATION**

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#### **AND THE MEDICAID REBATE:**

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#### **A MODEL**

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This appendix presents a basic mathematical (economic) model that explains the pricing behavior of a pharmaceutical manufacturer charging different prices to different groups of buyers. The model demonstrates the relationship between price and costs of production under differing degrees of price sensitivity that buyers may display and examines the impact of the Medicaid rebate program on that relationship.

A very basic model of third-degree price discrimination in which different groups of purchasers are charged different prices based on observable characteristics can be depicted as follows:

$$\Pi = (p_1 - c)q_1 + (p_2 - c)q_2$$

where:

$p_1$  = the price charged to group 1

$p_2$  = the price charged to group 2

$q_1$  = the quantity sold to group 1

$q_2$  = the quantity sold to group 2

$c$  = unit production costs (marginal cost), which are constant

The first-order conditions yield:

$$\frac{p_1 - c}{p_1} = - \frac{1}{\epsilon_1}, \quad \frac{p_2 - c}{p_2} = - \frac{1}{\epsilon_2}$$

where  $\epsilon_1$  and  $\epsilon_2$  represent the elasticities of demand of the respective group of purchasers. Assuming that group 2 has a more elastic demand than group 1, it will obtain a lower price. This model assumes that marginal cost is constant. Nothing is lost by that assumption if production costs per unit do not change when group 2 is served in addition to group 1.

If the manufacturer is restricted to offering the same price to both groups (uniform pricing), the inverse of the price-cost margin will be a weighted average of the elasticities of demand of each group where the weights are the quantities demanded. Under uniform pricing, group 1 will pay less and group 2 will pay more than when the manufacturer practices price discrimination.<sup>1</sup>

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1. Jean Tirole, *The Theory of Industrial Organization* (Cambridge, Mass.: MIT Press, 1989), pp. 137-140.

Accounting for the Medicaid rebate complicates the model somewhat. The share of retail sales purchased by Medicaid beneficiaries is denoted by  $m$ . The new profit-maximizing equation (assuming the minimum rebate is equal to 15 percent) is:

$$\Pi = (p_1 - c)q_1 + (p_2 - c)q_2 - \max\{0.15p_1, (p_1 - p_2)\}mq_1 - \max\{(p_1 - p_0), 0\}mq_1$$

where:

- $p_1$  = the price manufacturers charge the retail sector (the average manufacturer price)
- $p_2$  = the lowest price to any purchaser in the United States (the best price)
- $p_0$  = the inflated base-year price (used to calculate the additional rebate)
- $q_1$  = the quantity sold to the retail sector
- $q_2$  = the quantity sold at  $p_2$
- $m$  = the proportion of retail-sector sales made to Medicaid beneficiaries

In reality, many purchasers pay manufacturers many different prices. The point here is to focus on the retail sector and those purchasers that have access to the lowest prices. The model also assumes that the proportion of retail sales made to Medicaid beneficiaries ( $m$ ) does not change when  $p_1$  changes.

Purchasers not included in the model are those that pay less than  $p_1$  but more than  $p_2$ . Those purchasers can be divided into two groups: ones that pay more than 85 percent of  $p_1$  and ones that pay less than 85 percent of  $p_1$ . The former group will not be affected by the best-price provision. The latter group may be affected by the best-price provision if  $p_2$  rises by a sufficient amount. Hence, what happens to those purchasers can be assessed to some degree by examining what happens to  $p_2$ .

Three basic cases exist based on the difference between  $p_1$  and  $p_2$ .

**Case A:** Without the Medicaid rebate, the difference between  $p_1$  and  $p_2$  would be less than 15 percent of  $p_1$ .

In this case, firms would not offer group 2 a discount over 15 percent off the price to group 1 (the retail sector), even if there was no Medicaid rebate. Whether the difference between  $p_1$  and  $p_2$  would be this small depends on the difference in price elasticities between the two groups of purchasers. The ratio ( $p_2/p_1$ ) without the Medicaid rebate is equal to:

$$\frac{p_2}{p_1} = \frac{1 - \frac{1}{\epsilon_1}}{1 - \frac{1}{\epsilon_2}}$$

If this ratio is less than or equal to 0.85, then Case A holds. The profit-maximizing equation becomes:

$$\Pi = (p_1 - c)q_1 + (p_2 - c)q_2 - 0.15p_1mq_1 - \max[(p_1 - p_0), 0]mq_1$$

The first-order conditions for  $p_2$  do not change--the Medicaid rebate does not affect  $p_2$  in this case. The first-order conditions for  $p_1$  depend on whether  $p_1$  exceeds the inflated base-year price  $p_0$ . In the case where  $p_1$  does not exceed  $p_0$  (the additional rebate is equal to zero), the first-order condition for  $p_1$  implies:

$$\frac{p_1 - c}{p_1} = -\frac{1}{\epsilon_1} + 0.15m\left(1 + \frac{1}{\epsilon_1}\right)$$

The second term is positive, indicating that  $p_1$  (or the markup over cost) is higher because of the minimum rebate. When the effect of the additional rebate is considered, however, firms will be discouraged from raising  $p_1$  above the inflated base-year price.

In one instance, the Medicaid rebate could slightly raise the average manufacturer price (AMP) of drugs already on the market. For drugs for which the AMP would have increased more slowly than the inflation rate, the minimum rebate pushes the AMP slightly upward. That increase occurs because firms respond to the minimum rebate by increasing prices and the additional rebate does not take effect until prices rise faster than the rate of inflation. The minimum rebate and additional rebate together push the AMP toward the inflation-adjusted base-year price.

*Case B:* Without the Medicaid rebate, the difference between  $p_1$  and  $p_2$  exceeds 15 percent of  $p_1$ . Firms respond to the Medicaid rebate by limiting  $p_2$  to 85 percent of  $p_1$ .

Substituting for  $p_2$ , the profit maximization equation becomes:

$$\Pi = (p_1 - c)q_1 + (0.85p_1 - c)q_2 - 0.15p_1mq_1$$

Noting that the derivative of  $q_2$  with respect to  $p_1$  is:

$$\frac{\partial q_2}{\partial p_1} = 0.85 \frac{\partial q_2}{\partial p_2}$$

The first-order conditions for  $p_1$  imply:

$$\frac{p_1^{-c}}{p_1} = -\frac{1}{\epsilon_1} + 0.15m\left(1 + \frac{1}{\epsilon_1}\right) - 0.85 \frac{q_2}{q_1} \frac{1}{\epsilon_1} \left(1 + \frac{p_2^{-c}}{p_2} \epsilon_2\right)$$

Just as in Case A, the second term indicates that the minimum rebate puts upward pressure on  $p_1$ . The third term in the equation is negative, indicating that  $p_1$  is lower than in Case A. The third term reflects that fact that by lowering  $p_1$  slightly, firms can charge group 2 a price that is closer to their true profit-maximizing price, while maintaining  $p_2$  equal to 85 percent of  $p_1$ .

The third term implies that when firms choose to limit the best-price discount to 15 percent of the AMP, there is a small incentive to lower the AMP. However, since the size of the retail sector (group 2) is very large relative to the size of the market that previously obtained more than a 15 percent discount off the AMP (group 1), the effect has to be very small. That effect is also at least partially offset by the incentive to raise the AMP because of the minimum rebate. In Case B, the Medicaid rebate probably has a very small downward effect on the AMP, and the best price ( $p_2$ ) has increased to 85 percent of  $p_1$ .

Case C: Without the Medicaid rebate, the difference between  $p_1$  and  $p_2$  exceeds 15 percent of  $p_1$ . Firms respond to the Medicaid rebate by raising  $p_2$ , but  $p_2$  is still less than 85 percent of  $p_1$ .

The profit-maximizing equation becomes:

$$\Pi = (p_1 - c)q_1 + (p_2 - c)q_2 - (p_1 - p_2)mq_1$$

The first-order condition for  $p_2$  implies:

$$\frac{p_2^{-c}}{p_2} = -\frac{1}{\epsilon_2} \left(1 + \frac{mq_1}{q_2}\right)$$

In this case, the best-price provision increases  $p_2$ . The effect is greater as Medicaid's market share increases relative to the market share of those purchasers with access to the best price ( $q_2$ ).

In sum, the best-price provision increases the price paid by group 2 in Cases B and C but has no effect on the price paid by group 2 in Case A. The Medicaid rebate does not have much effect on  $p_1$ . The additional rebate discourages firms from

raising  $p_1$  faster than inflation to compensate for the minimum rebate. And when the best-price provision applies, there can be a very small incentive to lower  $p_1$ .

