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Rx Price Watch Report

Trends in Retail Prices of Generic Prescription Drugs Widely Used by Older Americans, 2006 to 2020

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AARP's Public Policy Institute informs and stimulates public debate on the issues we face as we age. Through research, analysis, and dialogue with the nation's leading experts, PPI promotes development of sound, creative policies to address our common need for economic security, health care, and quality of life.

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Executive summary

Retail prices for widely used generic prescription drugs declined, on average, between 2006 and 2020. Between 2019 and 2020, retail prices for 503 generic prescription drugs widely used by older Americans, including Medicare beneficiaries, increased by an average of 0.5 percent. This followed four consecutive years of substantial generic drug price decreases, peaking at 20.0 percent in 2019. In contrast, the general inflation rate rose by 1.3 percent in 2020. Generic drug prices have generally decreased over the past 15 years—the entire period during which the AARP Public Policy Institute has been publishing this report series.

In 2020, the average cost of therapy for a generic prescription drug, based on the market basket in this study, was $679 per year. On average, older Americans take 4.6 prescription drugs every month. Consequently, older adults who use generic prescription drugs are likely to have experienced an average annual retail cost of drug therapy of $3,122 in 2020.

Overview of findings

- Between 2019 and 2020, retail prices for 503 widely used generic prescription drugs increased by an average of 0.5 percent. The general inflation rate increased by 1.3 percent over the same period.
- The average annual cost for one generic medication used on a chronic basis was $679 in 2020. This represents a dramatic drop since 2016, when the average annual cost of therapy was almost two times higher ($1,336).
- All but two of the 503 generic prescription drug products in the study's market basket had retail price changes during 2020; 397 drug products (79 percent) had a price decrease, and the remaining 104 (21 percent) had a price increase.
  - — Four widely used generic drug products had retail price increases that were greater than 200.0 percent in 2020. One of these widely used generic drug products (hydrochlorothiazide 100-25 mg tablet, used to treat high blood pressure) had a retail price increase of more than 1,100 percent.
- Between January 2006 and December 2020, retail prices for 56 chronic-use generic drugs that had been on the market since the beginning of the study period decreased cumulatively by an average of 38.7 percent.
  - — The cumulative general inflation rate in the US economy was 32 percent during the same 15-year period.
- Thirty-five of the 46 drug manufacturer groups had weighted average generic drug price decreases in 2020. Weighted average annual prices increased for nine drug manufacturer groups—plus the "All Others" category—in 2020. One drug manufacturer group did not experience an average annual price change in 2020.
- Forty-eight of the 59 therapeutic categories of generic drug products—including the "Other Therapeutic Agents" category—had an average annual retail price decrease in 2020, ranging from 0.3 percent to 80.8 percent.
- Eleven therapeutic categories of generic drug products had an average annual retail price increase, nine of which more than tripled the rate of general inflation (1.3 percent).
  - — The therapeutic category with the highest generic drug price increase—angiotensin-receptor blocker (ARB)-diuretic combinations used to treat high blood pressure—had an average annual retail price increase of 205.5 percent in 2020.

Importance of savings from generic prescription drugs

The findings of this report highlight the unique pricing dynamics in the generic drug market when compared with those in the brand name drug market. While the retail prices for 503 generic prescription drugs widely used by older adults increased by an average of 0.5 percent in 2020, retail brand name drug prices—reported in a previous *Rx Price Watch* report—for 260 brand name prescription drugs widely used by older adults increased by an average of 2.9 percent in 2020.

Notably, the average annual retail price of therapy for widely used brand name drugs is considerably higher than that for widely

used generic drugs, and the price differential between these two market baskets is widening. In 2020, the average annual price of therapy for widely used brand name prescription drugs was almost 10 times higher than the average annual price of therapy for generic prescription drugs ($6,604 vs. $679, respectively). In 2016, the price differential between these same market baskets of brand name and generic drugs was substantially smaller ($5,506 vs. $1,336, respectively).

Generic drugs have long been a means of helping consumers and third-party payers reduce prescription drug costs. While generic drugs now account for more than 90 percent of all retail prescriptions filled in the United States, they account for only 20 percent of total spending on prescription drugs. The availability of economically competitive and lower-cost generic drugs will take on added importance as more brand name drugs and biologicals enter the market with unusually high prices. Equally important will be determining what is driving substantial retail price increases for some generic prescription drugs, as well as how these factors might be mitigated.

This report is the latest in the AARP Public Policy Institute's *Rx Price Watch* series. Separate reports analyze price changes for widely used brand name and specialty drug products. The series also analyzes the price changes for an overall market basket (i.e., brand name, generic, and specialty drug products combined) to reflect the overall market impact of drug price changes.

Introduction

AARP's Public Policy Institute finds that average retail prices for generic prescription drugs widely used by older Americans, including Medicare beneficiaries, generally fell between 2006 and 2020. This overall pattern is consistent with the pattern seen for generic drugs since the Public Policy Institute initiated its ongoing series of studies on prescription drug prices in 2004.[1] Between 2019 and 2020, retail prices[2] for 503 generic prescription drugs[3] widely used by older Americans, including Medicare beneficiaries, increased by an average of 0.5 percent. This followed four consecutive years (2016 through 2019) in which generic drug prices decreased on average; the previous three consecutive years (2013 through 2015) saw increases in generic drug prices. In contrast, the rate of general inflation in the US economy rose 1.3 percent in 2020.

In 2020, the average cost of therapy for a generic prescription drug, based on the market basket in this study, was $679 per year. On average, older Americans take 4.6 prescription drugs every month.[4] Consequently, those older adults who use generic prescription drugs are likely to have experienced an average annual retail cost of drug therapy of $3,122 in 2020—or nearly 11 percent of the median income for Medicare beneficiaries.[5]

Generic drugs have long been a means of helping consumers and third-party payers reduce and manage prescription drug costs.[6] Generics now account for more than 90 percent of all retail prescriptions filled in the United States but only 20 percent of total prescription drug spending,[7] and analysts have

1 The AARP Public Policy Institute in its *Rx Price Watch* series provides reports with separate analyses of the price changes for three different segments of the pharmaceutical market: brand name, generic, and specialty drug products. These three market baskets are important because a different mix of drug manufacturers typically makes the drug products in each segment and each of these segments is subject to unique market dynamics, pricing, and related behaviors. In addition, the *Rx Price Watch* series also reports the price change for an overall market basket (i.e., brand name, generic, and specialty drug products combined) to reflect the overall market impact of drug price changes. Some critics have argued that the brand name price index report alone overstates the effect of drug price changes on the overall prescription drug market. Those critics argue that an overall measure should include the effect of generic prescription drug price competition and the impact of generic substitution. This is precisely why the AARP *Rx Price Watch* series of reports also provides an overall market basket (including brand name, generic, and specialty drug products) to examine the price change impact for the overall prescription drug market. While this overall perspective is useful for those interested in understanding the industrial economics of the entire prescription drug market, consumers have proved to be considerably more interested in the price trend for the specific products that they take as an individual rather than all drug products on the market. In addition, separate analyses of the different market segments (i.e., brand name, generic, and specialty drug products) is important because they represent unique and distinct segments in the prescription drug market, and they provide an indication of policy changes that may be warranted in the various market segments. Previous reports from this series are on the AARP website at https://www.aarp.org/health/medicare-insurance/info-04-2009/rx_watchdog.html and http://www.aarp.org/rxpricewatch.

2 The retail prices used in this report are derived from the IBM® MarketScan® Commercial Database and MarketScan® Medicare Supplemental Database (IBM® MarketScan® Research Databases). The prices reflect the total price for a specific prescription that a pharmacy benefit manager (PBM) bills to a specific health plan for consumers enrolled in employer-sponsored or government-sponsored (i.e., Medicare or Medicaid) health plans and not simply the out-of-pocket cost (such as the copay) that a consumer would pay at the pharmacy. These amounts may or may not reflect what the PBM paid the pharmacy or the usual and customary price that a pharmacy would charge a cash-pay consumer for the same prescription.

3 The original market basket contained 505 widely used generic drug products. However, two drug products—ranitidine HCl 150 mg and 300 mg tablets—were withdrawn from the market in April 2020 and were dropped from the analysis. The FDA requested that all prescription and over-the-counter ranitidine products be withdrawn from the US market because these drug products may expose consumers to unacceptable levels of N-nitrosodimethylamine over time and, thus, they may increase the risk of cancer. See US Food and Drug Administration, *FDA Requests Removal of All Ranitidine Products (Zantac) From the Market*, April 1, 2020, https://www.fda.gov/news-events/press-announcements/fda-requests-removal-all-ranitidine-products-zantac-market.

4 Medicare Part D enrollees take an average of 4.6 prescription drugs per month. Medicare Payment Advisory Commission (MedPAC), *July 2022 Data Book: Health Care Spending and the Medicare Program* (Washington, DC: MedPAC, July 2022).

5 The median annual income for Medicare beneficiaries was $29,650 in 2019. See Wyatt Koma et al., *Medicare Beneficiaries' Financial Security Before the Coronavirus Pandemic* (Washington, DC: Kaiser Family Foundation, April 2020).

6 A generic drug is defined by the US Food and Drug Administration (FDA) as a "chemical clone" that has the same active ingredients as its FDA-approved brand name counterpart and that can be expected to have the same therapeutic effect as its brand name counterpart. See FDA, Center for Drug Evaluation and Research, *From Test Tube to Patient: Improving Health through Human Drugs* (Rockville, MD: FDA, September 1999). For the purposes of this analysis, a generic drug is any FDA-approved product that is rated as therapeutically equivalent to a product marketed by the original new drug application (NDA) holder. For the most part, this includes products with an abbreviated NDA. It also includes some products that have an NDA that was not the original NDA for the chemical entity, as well as "branded generics" (i.e., generic drug products that are marketed using a brand name [e.g., Levoxyl 100 mcg tablet]).

7 Association for Accessible Medicines, *2022 U.S. Generic & Biosimilar Medicines Savings Report* (Washington, DC: Association for Accessible Medicines, September 2022).

consistently linked the increased use of generic drugs to a recent deceleration in prescription drug spending growth.[8] The availability of economically competitive and lower-priced generic drugs will take on added importance as an increasing number of brand name drugs and biologicals enter the market with unusually high prices.[9]

This report presents annual and 15-year cumulative price changes through the end of 2020. The first set of findings shows *annual* rates of change in retail prices for widely used generic drugs from 2006 through 2020, using both rolling average and point-to-point methods (see Appendix A). The point-to-point method examines the distribution of price changes and differences in average percent changes in retail prices for individual drug products, specific manufacturers, and specific therapeutic categories. The second set of findings summarizes the *cumulative* impact of retail price changes for generic drugs that have taken place across the entire 15-year period from 2006 through 2020.

Findings

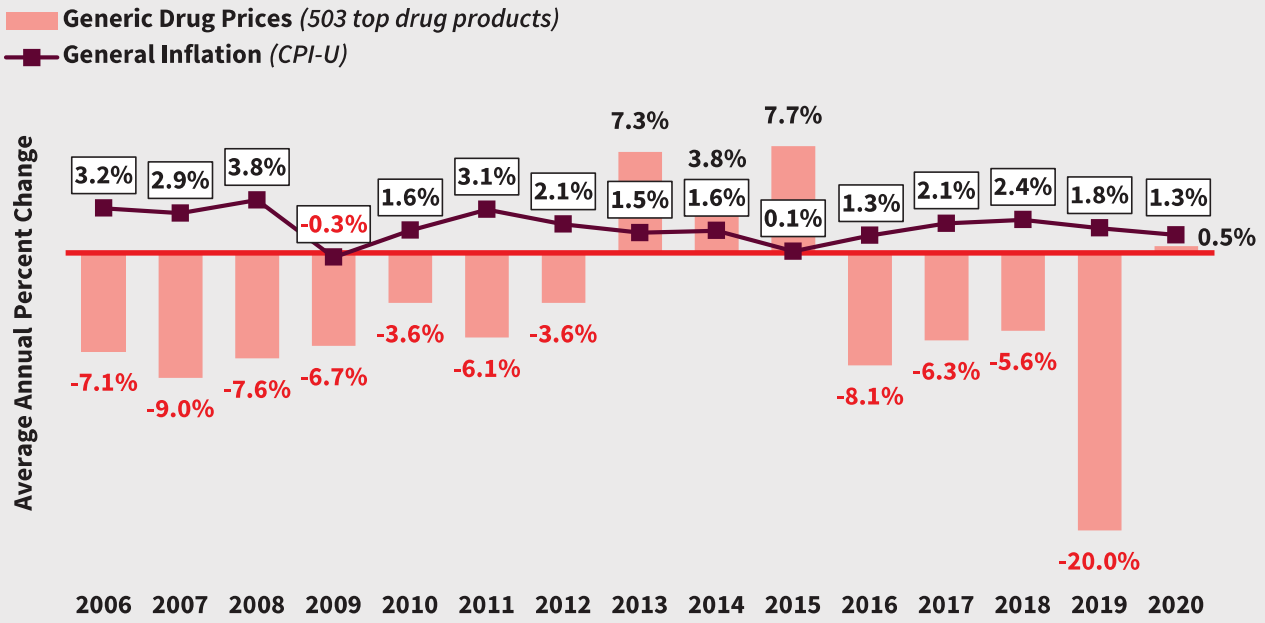
I. Generic price trends for most widely used prescription drugs

The average annual retail prices for generic prescription drugs increased by 0.5 percent in 2020.

- Retail prices for 503 generic drug products most widely used by older Americans increased by 0.5 percent in 2020 (Figure 1).[10] This followed four consecutive years in

FIGURE 1

Average Annual Generic Drug Price Increases Slightly in 2020 After Four Consecutive Years of Price Decreases



Note: *Calculations of the average annual generic drug price change include the 503 drug products most widely used by older Americans (see Appendix A).*

Prepared by the AARP Public Policy Institute and the PRIME *Institute, University of Minnesota, based on data from Truven Health MarketScan® Research Databases.*

8 Ibid. See also Congressional Budget Office, *Prescription Drugs: Spending, Use, and Prices* (Washington, DC: Congressional Budget Office, January 2022).

9 IQVIA Institute, The Use of Medicines in the U.S. 2023: Usage and Spending Trends and Outlook to 2027 (Durham, NC: IQVIA Institute, April 2023).

10 When measured as a 12-month rolling average and weighted by actual 2018 retail prescription sales to older Americans ages 50 and above, including Medicare beneficiaries.

which generic drug prices decreased on average, peaking at 20.0 percent in 2019. In contrast, the rate of general inflation rose by 1.3 percent in 2020.[11]

- The average annual generic drug price decreases from 2016 through 2019 followed three consecutive years in which generic drug prices increased on average in 2013, 2014, and 2015. These average annual increases ranged from 3.8 percent to 7.7 percent.

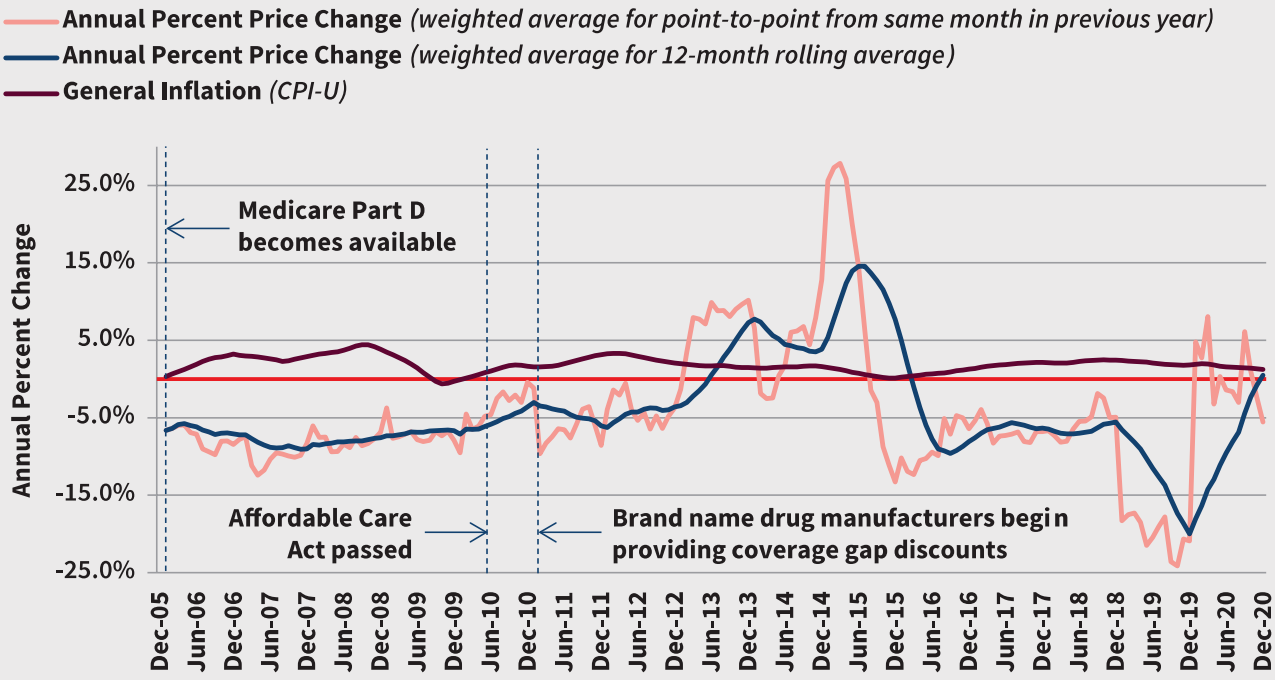
Like all prescription drugs, a variety of factors can influence the price of individual generic drug products. Many of these factors relate to the amount of market competition, or lack thereof, that a drug manufacturer faces in the market for a given drug product. For example, a generic drug manufacturer may decide to raise the price of a product if most or all of its competitors leave the market for some reason. In contrast, entry of additional competing generic products could lead a manufacturer to lower its price.[12]

The annual retail price changes for generic drug products reported in Figure 1 are average annual point-to-point price changes for each month in the preceding 12-month period (referred to as a *rolling average* change). This rolling average method smooths the trend line over the entire year compared to the annual change in a generic drug price that occurs for a single month compared to the same month in the previous year (referred to as an annual *point-to-point* change).

Figure 2 shows the percent change in generic drug prices for each month compared with the same month in the previous year. This

FIGURE 2

Rolling Average and Point-to-Point Changes in Retail Prices for Most Widely Used Generic Prescription Drugs Saw Large Fluctuations Between 2013 and 2020



Note: *Calculations of the average annual generic drug price change include the 503 drug products most widely used by older Americans (see Appendix A).*

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11 The general inflation rate used in this report is based on the average annual rate of change in the Consumer Price Index–All Urban Consumers for All Items (CPI-U), seasonally adjusted, Bureau of Labor Statistics series CUSR0000SA0.

12 US Food and Drug Administration (FDA), *Generic Competition and Drug Prices: New Evidence Linking Greater Generic Competition and Lower Generic Drug Prices* (Silver Spring, MD, December 2019).

trend is shown alongside the 12-month rolling average to allow for more detailed examination of the rate and timing of retail generic drug price changes over the entire study period. Figure 2 shows that, on average, the retail prices of generic drugs generally decreased between 2006 and 2020. Notably, a period of substantial and rapid price growth occurred in 2013 through the middle of 2015, followed by a four-year period of overall price decreases. However, by the end of 2020, generic drug retail prices had started to increase and returned to rates comparable to 2013.

II. Annual cost of generic drug therapy for chronic drugs most widely used by older Americans: 2006 to 2020

Two-thirds (332 of 503) of the generic drug products in this study's market basket are typically used for chronic conditions.

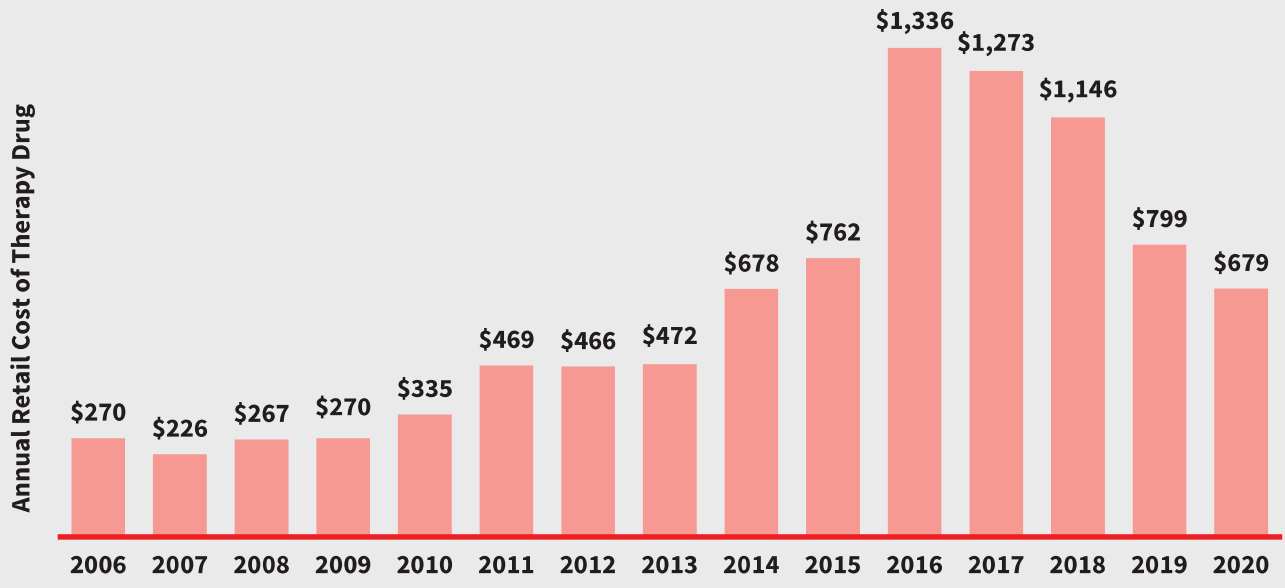
The annual cost of generic drug therapy for chronic drug products was $679 per drug, per year, in 2020. This represents a dramatic drop since 2016, when the average annual cost of therapy was almost two times higher ($1,336).[13]

Figure 4 presents the retail price for widely used generic drugs indicated for treating chronic conditions when the price is expressed as an average annual price of therapy per drug.

- The average price of therapy was $679 per drug, per year, for chronic generic prescription drugs at the retail level in 2020.
- The average annual retail price of therapy for widely used chronic generic drugs increased fairly steadily between 2007 and 2016 but began to decline in 2017.
- The average annual cost ($679) of chronic generic prescriptions in 2020 is almost 2.5 times higher than the average annual cost ($270) in 2006–the year Medicare implemented the Part D program.

FIGURE 3

The Average Annual Retail Price of Widely Used Generic Drugs for Chronic Conditions Was $679 in 2020



Note: *Calculations of the average annual price of generic drug therapy include the 332 drug products most widely used by older Americans for chronic conditions (see Appendix A).*

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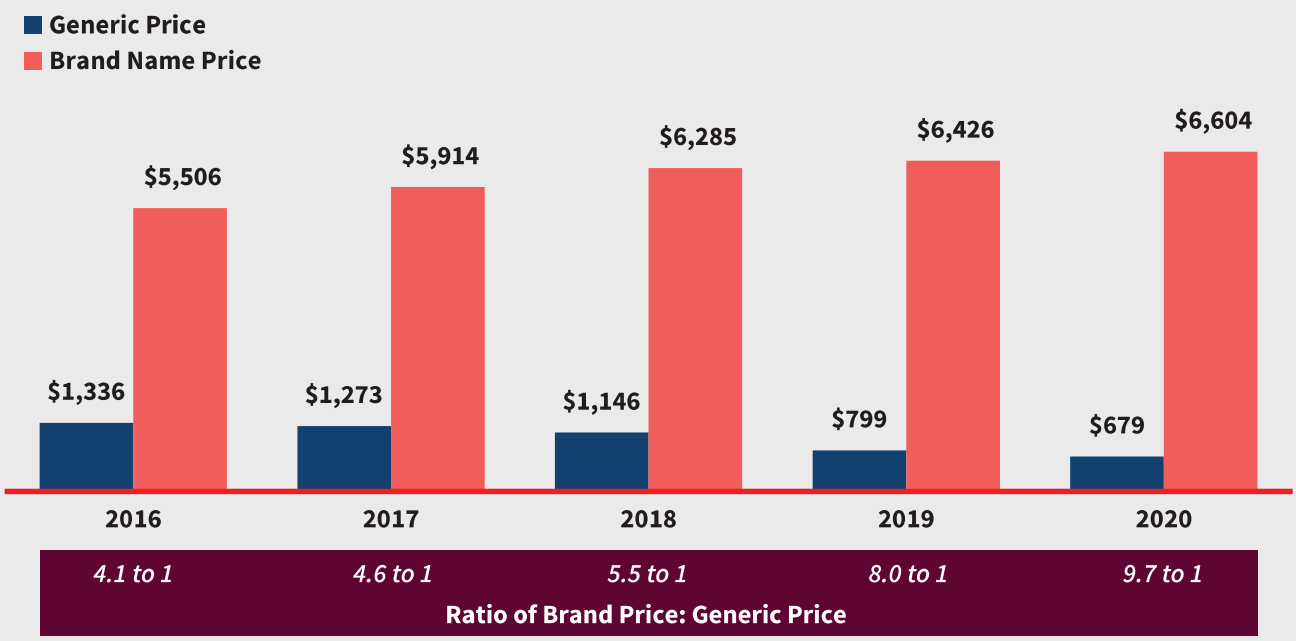
13 These prices reflect the total price that a PBM bills to a specific health plan and not simply the out-of-pocket cost that a consumer would pay at the pharmacy.

FIGURE 4

Average Annual Cost of Therapy for Widely Used Generic Drugs Is About One-Tenth of the Cost of Therapy for Widely Used Brand Name Drugs in 2020



Prepared by the AARP Public Policy Institute and the PRIME *Institute, University of Minnesota, based on data from Truven Health MarketScan® Research Databases. Calculations for 2020 exclude ranitidine HCl 150 mg and 300 mg tablets, which were withdrawn from the market in April 2020.*

Older Americans obtain an average of 4.6 different drugs per month.[14] If they used generic drugs to treat each of their chronic conditions, they would have experienced an average annual retail cost for drug therapy of $3,122 for their medications in 2020. This amount is nearly 11 percent of the median income for Medicare beneficiaries ($29,650).[15]

It is noteworthy that the average annual retail price of therapy for widely used brand name drugs is considerably higher than that for widely used generic drugs, and that the price differential between these two market baskets is widening.

In 2020, the average annual price of therapy for widely used brand name prescription drugs was almost 10 times higher than the average annual price of therapy for generic prescription drugs ($6,604 vs. $679 respectively).[16] This means that for one-half of all Medicare beneficiaries, the annual cost of using 4.6 brand name drugs ($30,376) would have exceeded their total annual income.[17]

III. A wide range of generic drug price changes occurred in 2020

All but two of the 503 most widely used generic prescription drug products in this study's market basket had a retail price change in 2020 (Figure 5).

In 2020, the annual retail price decreased for 397 of the 503 most widely used generic drug products. More than two-thirds of these price

14 Medicare Part D enrollees receive an average of 4.6 prescription drugs per month. MedPAC, *July 2022 Data Book*.

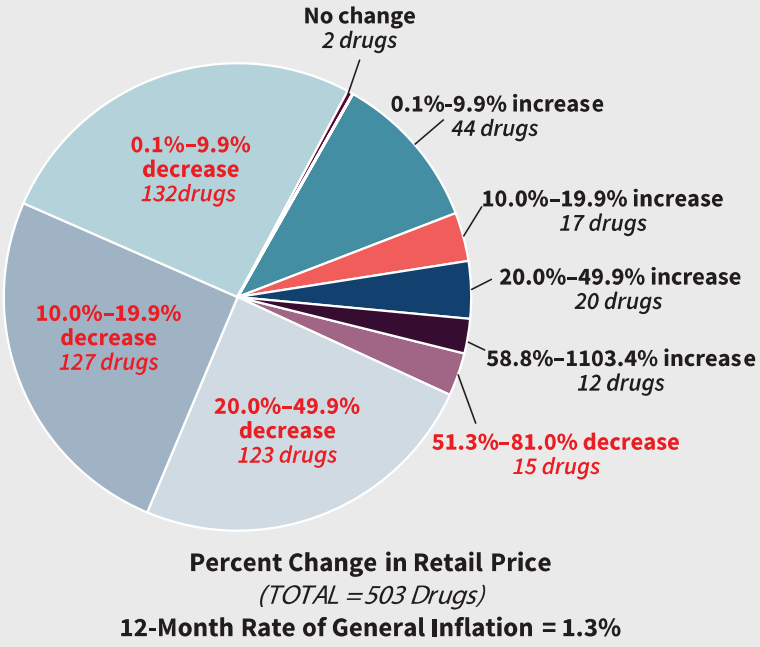
15 One-half of all Medicare beneficiaries had incomes below $29,650 (the median) in 2019. Wyatt Koma et al., *Medicare Beneficiaries' Financial Security before the Coronavirus Pandemic* (Washington, DC: Kaiser Family Foundation, April 2020).

16 Stephen W. Schondelmeyer and Leigh Purvis, "*Rx Price Watch* Report: Trends in Retail Prices of Brand Name Prescription Drugs Widely Used by Older Americans: 2006 to 2020," Research Report #2021-31, AARP Public Policy Institute, Washington, DC, June 2021.

17 One-half of all Medicare beneficiaries had incomes below $29,650 (the median) in 2019. Wyatt Koma et al., *Medicare Beneficiaries' Financial Security before the Coronavirus Pandemic*.

FIGURE 5

More Than 20 Percent of the Most Widely Used Generic Drugs Had Retail Price Increases in 2020



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decreases were substantial (≥10 percent). Of the 397 (79 percent) generic drug products with an annual retail price decrease:

- 132 (26 percent) generic drug products had a price decrease between 0.1 percent and 9.9 percent;
- 250 (49 percent) generic drug products had a price decrease between 10.0 percent and 49.9 percent;
- 15 (3 percent) generic drug products had an annual retail price decrease between 50.0 percent and 81.0 percent.

Five generic drug products had retail price decreases that exceeded 65 percent (Figure 6). Three generic drug products (dutasteride 0.5 mg capsule, a prostate hypertrophy agent, and sildenafil citrate 50 mg and 100 mg tablets, a sexual function disorder medication) had a price decrease of more than 75 percent in 2020.

Annual retail prices increased for 104 (21 percent) of the 503 most widely used generic drug products; 93 of these increases met or exceeded the rate of general inflation (1.3 percent) in 2020.

Some of the retail price increases among the market basket of widely used generic prescription drug products were substantial (≥10 percent). Thirty-two generic drug products (6 percent) had annual retail price increases of 20.0 percent or more, which is more than 15 times the rate of inflation in 2020:

- Twenty (4 percent) generic drug products increased by 20.0 percent to 49.9 percent.
- Twelve (2 percent) generic drug products increased by 50.0 percent to 1,103.4 percent.

The four widely used generic drug products with the highest retail price increases had prices that more than tripled in 2020, with jumps of greater than 200.0 percent (Figure 7).

One of these widely used generic drug products (losartan potassium and hydrochlorothiazide 100-25 mg tablet, used to treat high blood pressure) had a retail price increase of more than 1,100 percent.

FIGURE 6

Five Widely Used Generic Drug Products Had One-Year Retail Price Decreases of More than 65 Percent in 2020

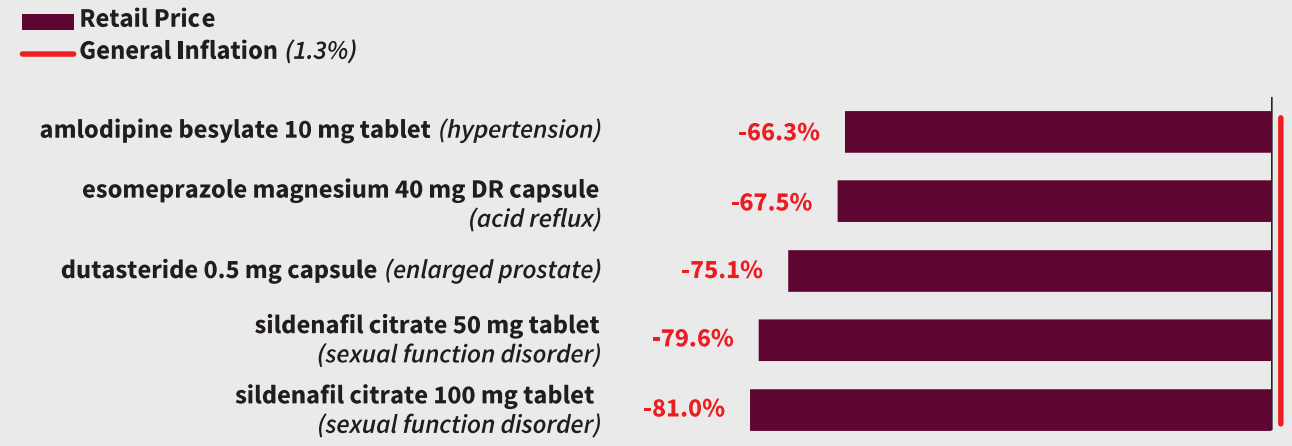

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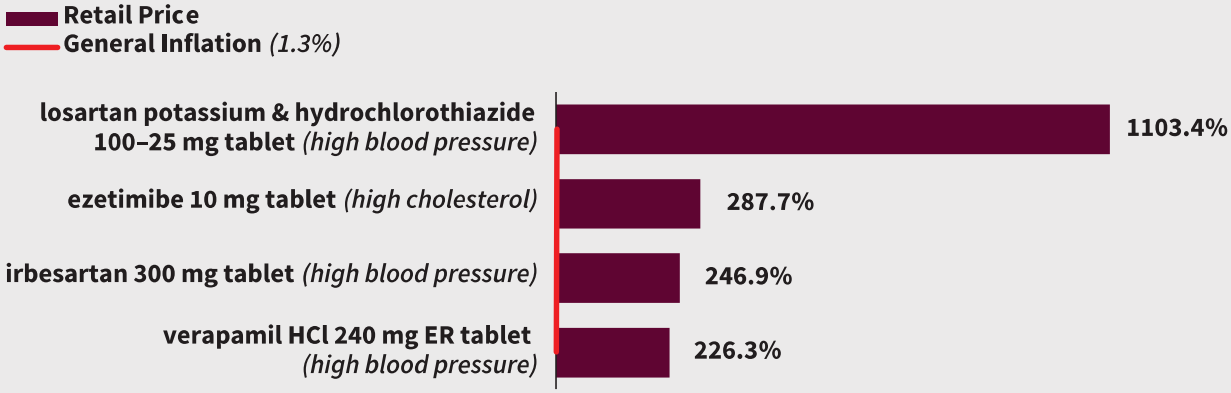
FIGURE 7

Four Widely Used Generic Drug Products Had One-Year Retail Price Increases of More Than 200 Percent in 2020



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IV. Fifteen-year cumulative retail price changes for most widely used generic prescription drugs, 2006 to 2020

This AARP report tracked generic drug prices at the retail level for the 15-year period from December 31, 2005, to December 31, 2020. About 23 percent (117 of 503) of the widely used drugs in the generic market basket were on the market for the entire 15-year period. Forty-eight percent (56 of 117) of those drug products were used to treat chronic conditions, and this report used this group of chronic medications to analyze the 15-year price trends among widely used generic drug products.

Cumulatively, the average retail price for these 56 widely used chronic generic drug products decreased by 38.7 percent over the 15-year period, from $203 to $124, compared with a 32.0 percent increase for general inflation

in the same 15-year period.[18] Even though the retail price of widely used generic drugs declined by 38.7 percent overall between the end of 2005 and the end of 2020, the retail price of generic drugs saw a 30 percent increase in price, from $133 in 2010 to $174 in 2014. The average generic price for this set of generic drug products then declined markedly from 2014 through 2020.

The 15-year cumulative decrease in the average annual price of therapy for the 56 widely used generic drug products was $78 by the end of 2020. For a consumer who takes 4.6 generic medications, this translates into an average decrease in annual therapy price of $361 between December 31, 2005, and December 31, 2020.[19]

V. Retail price changes for most widely used generic prescription drugs, by manufacturer

Forty-five drug manufacturers[20] had at least two drug products in the study's market basket of 503 widely used generic drugs. These 45 manufacturers supplied 490 drug products that accounted for 98 percent of the generic drug sales and prescriptions dispensed among the overall market basket of 503 generic drugs. The remaining 13 drug products from generic drug firms with one drug product per firm were grouped together in an "All Others" category, resulting in 46 reported drug manufacturer groups.

Weighted average annual prices increased for nine drug manufacturer groups plus the "All Others" category; one drug manufacturer group did not have an average annual price change in 2020 (Figure 8). The remaining 35 drug manufacturer groups had a decrease in their average annual prices. This indicates that most generic drug manufacturers decreased rather than increased the prices for their generic drug products in the 2020 market basket.

However, it is noteworthy that among the nine drug manufacturer groups–plus the "All Others" category–that had an average annual generic price increase at the retail level, all had price increases that were at least four times the rate of general inflation (1.3 percent) in 2020.

- Four drug manufacturer groups with weighted average annual retail price increases had price increases of more than 14 percent in 2020, or more than 10 times the rate of general inflation over that same period.

Thirty-five drug manufacturer groups had weighted average generic drug price decreases in 2020. These price decreases mean that the change in retail generic drug prices was well below the rate of general inflation (1.3 percent increase) in 2020.

- These 35 drug manufacturer groups with average price decreases represent 73 percent (365 of 503) of the generic drug products in the market basket in 2020.

Nearly one-half of the drug manufacturer groups (24 of 46) had average annual retail price decreases of more than 10 percent in 2020 for their generic drug products in the market basket.

- Two drug manufacturers–Biocon Pharm and Strides Pharm–had average annual price decreases of more than 60 percent in 2020.

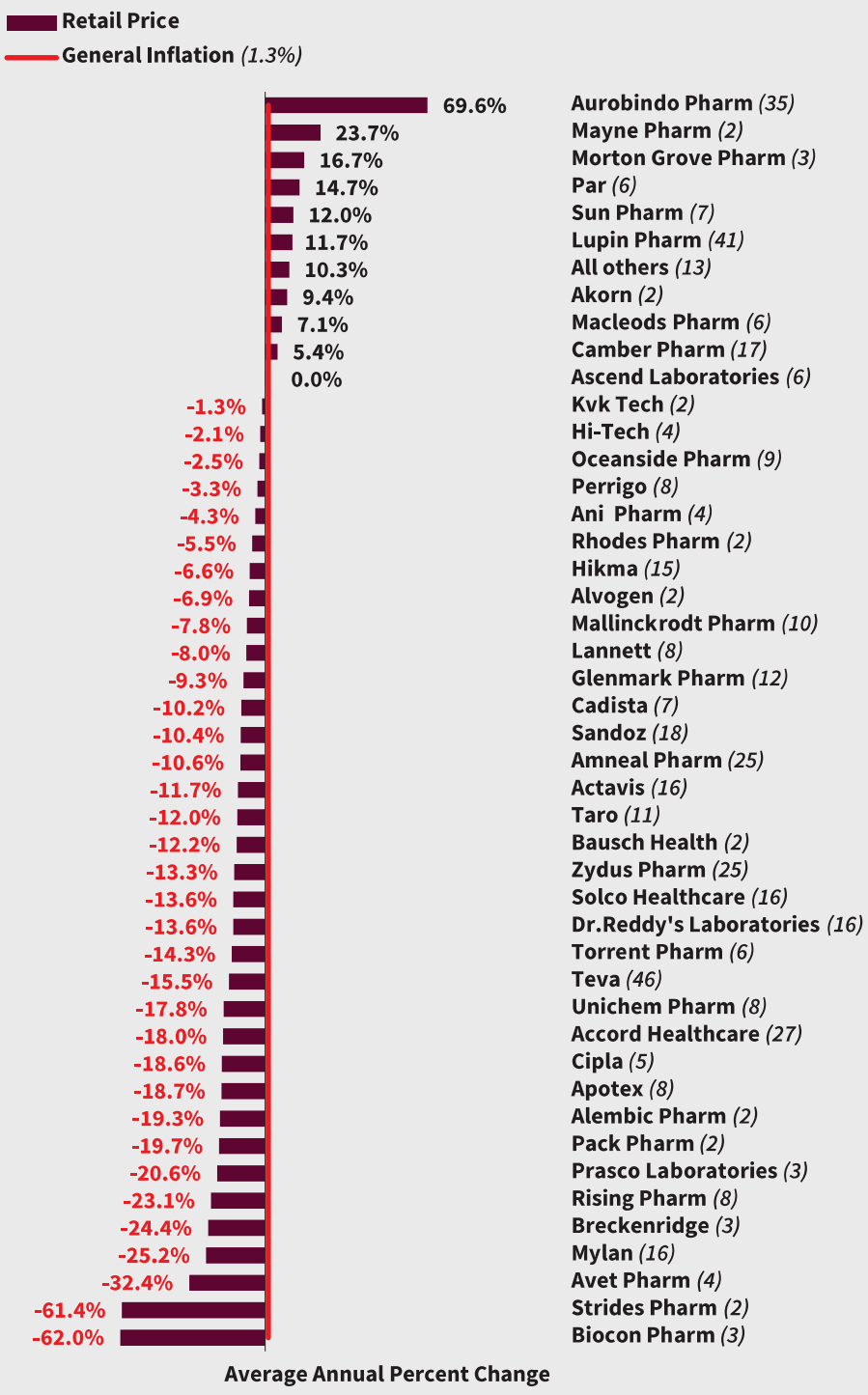
18 The average 15-year cumulative decrease in retail prices for the 117 generic drug products (both chronic and acute use) that were on the market for the entire 15 years from 2006 to 2020 was 25.8 percent, lower than the cumulative price decrease of 38.7 percent seen after removal of drug products used for acute conditions. This difference is because of several acute-use drug products that experienced high retail price increases between December 2005 and December 2020.

19 This difference does not capture the substantial savings consumers receive initially by switching from a brand name product to a generic product once the brand name drug loses its patent. As noted earlier, brand name drugs typically cost almost 10 times as much as generic drugs.

20 If a listed manufacturer is a division of another firm, this analysis considers the drugs as marketed by the parent firm. This includes cases in which the firm marketing a drug product may have changed over time because of mergers and acquisitions, divestitures of specific drug products, or other reasons.

FIGURE 8

Retail Prices for Widely Used Generic Drug Products Fell for Most Manufacturers in 2020; 10 Manufacturer Groups Saw Retail Prices Increase



Note: *Calculations of the average annual generic drug price change include the 503 drug products most widely used by older Americans (see Appendix A). Manufacturers with only one drug product in the market basket of 503 most widely used generic prescription drugs were included in the "All Others" category. The number in parentheses after a manufacturer's name indicates the number of drug products in the market basket for that manufacturer. The general inflation rate is based on CPI-U for All Items, seasonally adjusted, Bureau of Labor Statistics series CUSR0000SA0 for 2020.*

Prepared by the AARP Public Policy Institute and the PRIME *Institute, University of Minnesota, based on data from Truven Health MarketScan® Research Databases.*

VI. Retail price changes for most widely used generic prescription drugs, by therapeutic category

Fifty-eight therapeutic categories[21] had at least two drug products in the study's market basket of 503 widely used generic drugs. Another 37 drug products that were the only member of a therapeutic category were grouped together in an "Other Therapeutic Agents" category, resulting in 59 reported therapeutic categories.

Eleven of the 59 therapeutic categories of generic drug products in the study market basket had *increases* in average retail prices in 2020. Nine of the categories had an average annual retail price increase that more than tripled the rate of general inflation (1.3 percent) in 2020 (Figure 9).

- The therapeutic category with the highest generic drug price increase—angiotensin-receptor blocker (ARB)-diuretic combinations used to treat high blood pressure—had an average annual retail price increase of 205.5 percent in 2020.

Generic drug prices at the retail level decreased in 2020 for 48—including the "Other Therapeutic Agents" category—of the 59 therapeutic categories examined in this study.

- Roughly one-third of the therapeutic categories (17 of 48) had decreases in average retail prices for generic drugs of less than 10 percent during 2020.
- Almost two-thirds of the therapeutic categories (31 of 48) had average annual retail price decreases for generic drugs of more than 10 percent in 2020.
- One therapeutic category—used to treat sexual dysfunction disorders—had an average retail price decrease of 80.8 percent in 2020.

Concluding observations

The retail prices of most generic drug products in the market basket decreased in 2020. Some of these generic price decreases were substantial. However, more than one-fifth (21 percent) of the generic drug products had price increases in 2020.

These findings highlight the unique pricing dynamics in the generic drug market. While the retail prices for 503 generic prescription drugs widely used by Medicare beneficiaries increased by an average of 0.5 percent in 2020, a previous *Rx Price Watch* report found that the retail prices for 260 brand name prescription drugs most widely used by older Americans increased by an average of 2.9 percent over the same period.

Notably, the average annual retail price of therapy for widely used brand name drugs is considerably higher than that for widely used generic drugs, and the price differential between these two market baskets is widening. In 2020, the average annual price of therapy for widely used brand name prescription drugs was more than 10 times higher than the average annual price of therapy for generic prescription drugs ($6,604 vs. $679, respectively). In 2016, the price differential between these same market baskets was substantially lower.

Generic drug prices are typically considerably lower than the prices of their brand name counterparts, saving money for consumers and other payers.[22] However, in recent years, the increasing prevalence of substantial generic drug price increases has attracted the interest and concern of consumers, payers, and policy makers. The availability of economically competitive and lower-cost generic drug products will take on added importance as an increasing number of brand name drugs and biologicals enter the market with unusually high prices.[23]

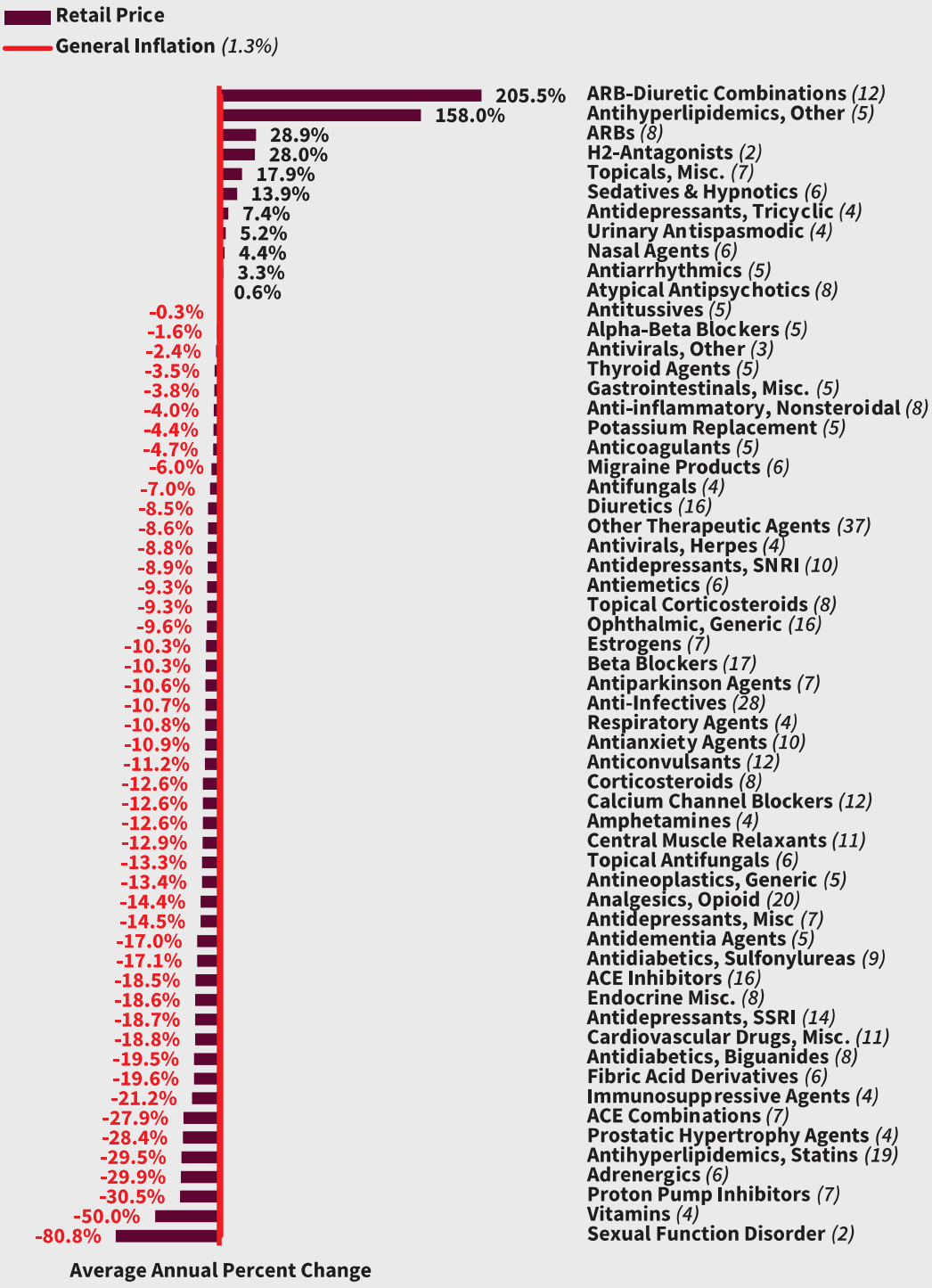
21 The therapeutic categories used in this study were assigned based on an intermediate level of the Generic Product Identifier (GPI) code that specifies the groupings of similar chemical entities, such as "Calcium Channel Blockers." When two or more drug products at the National Drug Code level in the market basket were in the same intermediate GPI code category, the category was reported separately in the therapeutic category analysis.

22 Association for Accessible Medicines, *2022 Generic & Biosimilar Savings*.

23 IQVIA Institute, *Use of Medicines* 2023.

FIGURE 9

Eleven Therapeutic Categories for Generic Drugs Had Retail Price Increases in 2020; Prices for All Other Categories Fell



Note: *Calculations of the average annual generic drug price change include the 503 drug products most widely used by older Americans (see Appendix A). See Appendix B for an explanation of therapeutic category acronyms. The number in parentheses after a therapeutic category indicates the number of drug products in the market basket for that therapeutic category. The general inflation rate is based on the CPI-U for 2020.*

Prepared by the AARP Public Policy Institute and the PRIME *Institute, University of Minnesota, based on data from Truven Health MarketScan® Research Databases.*

Appendix A. Detailed methodology and description of retail price data

This appendix describes in detail how brand name, generic, and specialty drugs are defined in this study; how the study identified the market basket (i.e., sample) of drugs; how it measured prices; and how it calculated weighted average price changes. In addition, the appendix describes methods and assumptions used to determine prices and price changes by drug manufacturer and by therapeutic category.

Overview

AARP's Public Policy Institute has been publishing a series of reports that track price changes for the prescription drug products most widely used by older Americans, with annual and quarterly results reaching as far back as 2000. Since 2008, these reports have focused on price changes for three market baskets–brand, generic, and specialty drugs. In addition, a combined market basket (i.e., brand, generic, and specialty) has been added to the series, which is useful to view the price change trend across all types of outpatient prescription drugs in the US market. While this overall perspective is useful for those interested in understanding the industrial economics of the entire prescription drug market, consumers have proved to be considerably more interested in the price trend for the specific products that they are taking as individuals rather than all drug products on the market.

The AARP Public Policy Institute and the University of Minnesota's *PRIME* Institute originally collaborated to report an index of manufacturers' drug price changes based on the Wholesale Acquisition Cost (WAC) from the Medi-Span Price-Chek PC database.[24] In 2009, AARP and the *PRIME* Institute created an additional drug price index based on actual retail prices[25] from the Truven Health MarketScan® Commercial Database and MarketScan® Medicare Supplemental Database (MarketScan® Research Databases).[26] Thus, the report series uses the same market basket of brand name prescription drugs widely used by older Americans to examine both manufacturer-level prices and retail-level prices in the market. The addition of retail-level prices allows the AARP Public Policy Institute to assess what prices payers (i.e., insurers, consumers, or government programs) are paying and whether rebates and other types of discounts have been passed along to payers and their covered members.

Recently, the AARP Public Policy Institute and the University of Minnesota's *PRIME* Institute collaborated to develop a new market basket of widely used prescription drugs based on 2018 data provided by the IBM® MarketScan® Research Databases and a large Medicare Part D plan provider. UnitedHealthcare provides Medicare Part D coverage and is the organization that insures the AARP Medicare Rx plans. This Medicare Part D plan provider supplied data for all prescriptions provided to its Medicare Part D enrollees in 2018. This *Rx Price Watch* report used the 2018 market basket.[27] As in the past, the series will include separate data sets, analyses, and reports for brand name, generic, and specialty drugs, as well as the overall combined market basket.

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24 Medi-Span is a private organization that collects price and other clinical and drug-related data directly from drug manufacturers and wholesalers. Price-Chek PC (now Price Rx Pro®) is a product of Medi-Span (Indianapolis, Indiana), a division of Wolters Kluwer Health Inc., and uses data from Medi-Span's Master Drug Database (MDDB®). See https://www.wolterskluwer.com/en/solutions/medi-span.

25 The retail prices used in this report series reflect the total price for a specific prescription that a PBM bills to a specific health plan for consumers enrolled in employer-sponsored or government-sponsored (i.e., Medicare or Medicaid) health plans and not simply the out-of-pocket cost (such as the copay) that a consumer would pay at the pharmacy. These amounts may or may not reflect what the PBM paid the pharmacy or the usual and customary price that a pharmacy would charge a cash-pay consumer for the same prescription.

26 The Truven Health MarketScan® Research Databases (previously the IBM® MarketScan® Research Databases and now the Merative® MarketScan® Research Databases), a family of databases, contain individual-level health care claims, lab test results, and hospital discharge information from large employers, managed care organizations, hospitals, Medicare, and Medicaid programs. Truven Health constructed the MarketScan® Research Databases by collecting data from employers, health plans, and state Medicaid agencies and placing them into databases.

27 Drug products subsequently approved by the US Food and Drug Administration are not included in our current market basket but will be included in future market baskets if they meet our inclusion criteria.

Defining brand, generic, and specialty pharmaceuticals

A brand name drug is defined as a product marketed by the original holder of a new drug application (NDA, or related licensees) or a biological license application (BLA; or related licensees) for a given drug entity. A generic drug is defined as any drug product marketed by an entity other than the NDA or BLA holder or the related licensees.

The market conditions and pricing behavior for brand name and generic drugs are quite different. For example, brand name drugs have a monopoly based on patents and other forms of exclusivity for a number of years after market entry,[28] and they do not experience typical price competition from therapeutically equivalent (i.e., AB-rated generic equivalents) drug products that can be routinely and directly substituted at the pharmacy level. On the other hand, generic drug products typically face price competition from the time the generic first enters the market, when there are two or more therapeutically equivalent drug products (as evaluated by the US Food and Drug Administration [FDA] and reported in the Orange Book), including the brand name product. However, certain generic drugs—that is, those for which the generic manufacturer files a paragraph IV certification of patent non-infringement—may receive 180 days of exclusivity as the sole generic after this first generic drug product is approved. In cases in which there is only one generic drug product on the market, the level of economic competition may be somewhat limited until other economically independent generic marketers enter the market.

Specialty pharmaceuticals are drugs that treat complex, chronic conditions and that often require special administration, handling, and care management. Specialty drugs have been the fastest-growing group of new drug products over the past decade. This important group of drugs and biologicals is not precisely defined, but it includes products based on one or more of the following: (1) how they are made, (2) how they are approved by the FDA, (3) conditions they treat, (4) how they are used or administered, (5) their cost, and (6) other special features. The operational definition of specialty drugs for this study is further described in a later section on the methodology.

Creating the market basket of drugs

The AARP Public Policy Institute has been reporting prescription drug product price changes since 2004. The original reports were based on a market basket of retail and mail-order prescriptions provided to about 2 million people ages 50 and older who used the AARP Pharmacy Service in 2003. Following the implementation of the Medicare Part D program, we chose to develop a new market basket of drugs using 2006 data provided by UnitedHealthcare (formerly called PacifiCare), which is also the organization that insures the AARP Medicare Part D plans.

Subsequently, we updated the AARP market baskets again using 2011 data provided by Truven Health MarketScan® Research Databases (IBM® MarketScan® Research Databases, now Merative MarketScan® Research Databases) and the same Medicare Part D plan provider that was used for the 2006 market basket. We weighted the data from the Medicare Part D plan provider by Part D enrollment and the data from the IBM MarketScan® Research Databases by the 50-plus population less Part D enrollment, based on data from the Centers for Medicare and Medicaid Services and the US Census. We then merged the weighted data to develop and rank a weighted master list by prescription volume and sales at the National Drug Code (NDC) level for the new AARP market baskets.

This process was repeated using 2014 and 2018 data provided by the same data sources. The 2018 market basket is the basis of this report and subsequent *Rx Price Watch* reports.

28 Market exclusivity periods for new brand name drugs range from 13 to 17 years. See Benjamin N. Rome, ChangWon C. Lee, and Aaron S. Kesselheim, "Market Exclusivity Length for Drugs with New Generic or Biosimilar Competition, 2012–2018," *Clinical Pharmacology & Therapeutics* 109, no. 2 (2020): 367–71.

Our selection of the market basket of drugs to track in the price index was a multistep process. First, prescriptions covered and adjudicated by the commercial entities included in the merged data set were grouped by NDC number. The NDC is a number that refers to a specific drug product presentation with a unique combination of active chemical ingredient, strength, dosage form, package type and size, and manufacturer (e.g., Eliquis [apixaban] 5 mg, tablet, bottle of 60, Bristol Myers Squibb). As a result, some drug entities (i.e., molecules) could appear more than once among the widely used drug products (e.g., when there are different strengths, such as Eliquis 2.5 mg and Eliquis 5 mg). For each NDC, we calculated total sales revenue from adjudicated prescription claims, including the patient cost-sharing amount, as well as the total prescriptions dispensed, the total units supplied, and the total days of therapy provided during 2018.

The next step involved merging the use and expenditure data from the IBM® MarketScan® Research Databases and the Medicare Part D plan provider by NDC code and then linking the data with descriptive information from Medi-Span's Price Rx Pro® drug database,[29] using the NDC number as the key linking variable. The descriptive data from Price Rx Pro® included drug product information such as brand name, generic name, manufacturer, patent status, package size, route of administration, usual dose, therapeutic category, usual duration, and each price history.

All NDCs were classified by the patent status of the drug product presentation—that is, patented brand name (i.e., brand single source [SS]), off-patent brand name (i.e., brand multiple source [BMS] or innovator multiple source [IMS]), and off-patent generic (i.e., generic multiple source [GMS] or non-innovator multiple source [NMS]). We then grouped all NDC numbers by the Generic Product Identifier (GPI) code into GPI-patent status groups using the GPI code from Price Rx Pro®. The GPI combines drug products into a common group when they have the same active ingredients, dosage form, and strength—a single GPI includes the NDCs for any package type and size and from all manufacturers. When patent status is combined with the GPI categories, each GPI will typically be either a single source GPI (GPI-brand single source) or a multiple source GPI with both a GPI-brand multiple source group and a GPI-generic multiple source group.

The next step involved summing the total expenditures, number of prescriptions dispensed, and days of therapy provided across all NDCs within each GPI-patent status group. The NDCs within each GPI-patent status group were then rank ordered based on total annual expenditure for each NDC. The designated "representative NDC" was the NDC that had the highest level of expenditure within each GPI-patent status group. If the NDC with the greatest expenditure level was inactive, then the NDC with the next highest level of expenditure became the representative NDC.

This analysis excluded less than 0.5 percent of the expenditures and the prescriptions because they were for nondrug items. These nondrug items included devices, medical and diabetic supplies, syringes, compounding service fees, and other professional services. After exclusion of nondrug items, the 2018 data set contained 33,550 NDCs grouped into 5,872 GPI-patent status categories.

We then coded all GPIs to distinguish the specialty prescription drugs from other regular, or traditional, prescription drugs. The definition of specialty prescription drugs used here is a prescription drug that is (1) administered by injection, such as intravenous, intramuscular, subcutaneous, or other injection site (not including insulin); (2) a drug product approved by the FDA through a BLA (biological license application); (3) any drug product that has a total average prescription cost greater than $1,500 per prescription; or (4) any drug product that has a total average cost greater than $50 per day of therapy. The drug products that met this definition were considered "specialty drugs" and all other prescription drugs were considered "regular,"

29 Price Rx Pro® is a product of Medi-Span (Indianapolis, IN), a division of Wolters Kluwer Health, Inc., and is based on data from Medi-Span's MDDB®.

"traditional," or "nonspecialty" drugs. Throughout this report, references to the market basket of drugs refer to the regular (nonspecialty) drugs unless otherwise indicated. Only specialty drugs provided through a Medicare Part D program or under a prescription drug benefit program are included. The specialty drugs provided under Medicare Part B, or under a commercial health plan and administered in a clinic or physician's office and billed as a medical claim, are not included in this data set or this analysis.

All NDCs were classified by the patent status of the drug product presentation–that is, patented brand name (or SS), off-patent brand name (or IMS), or off-patent generic (NMS). We classified both the regular and the specialty drug data sets by patent status.

We sorted the list of all GPI-patent status groups in the merged data set for 2018 by three criteria: (1) total prescription expenditures, (2) number of prescriptions dispensed, and (3) days of therapy provided. The top 500 GPI-patent status categories were identified for each of these three criteria. Because some GPI-patent status groups appeared in more than one of these top 500 lists, the combined list of all GPI-patent status groups totaled 950. There were 260 brand name GPI-patent status groups (i.e., both brand single source and brand multiple source) and 505 generic GPI-patent status groups. Also, 185 GPI-patent status groups in this combined top 500 list were classified as specialty drugs.

The three market baskets (brand name, generic, and specialty drugs) combined accounted for 85.7 percent of all prescription drug expenditures and 43.3 percent of all prescriptions dispensed to those over age 50 in 2018.

Monitoring retail drug prices

The original Rx Watchdog reports were based on market baskets of drugs constructed using data from a Medicare Part D plan provider for 2006 and manufacturer drug price changes measured using WAC data from the Medi-Span Price-Chek PC database. The AARP Public Policy Institute and the University of Minnesota's *PRIME* Institute collaborated to develop a retail drug price index known as the *Rx Price Watch* reports, based on retail-level prescription prices from the Truven Health MarketScan® Research Databases (IBM® MarketScan® Research Databases, now Merative MarketScan® Research Databases). This retail price index allows the AARP Public Policy Institute to assess retail prices actually paid by consumers or insurers and to determine whether the rebates and discounts sometimes given to payers are being passed along to consumers.

Retail data description

Data for the current analyses were drawn from the IBM® MarketScan® Research Databases, which consisted of three core claims databases, a hospital discharge database and an electronic medical record database, as well as several linked databases, data sets and files that combine claims data with other patient and employee data at the patient level.[30] The warehouse featured an opportunity sample from multiple sources (e.g., employers, states, health plans), more than 32 billion service records, and over 200 million covered individuals.[31] The data used in the *Rx Price Watch* analyses were drawn from the IBM® MarketScan® Commercial Claims and Encounters Database (Commercial Database) and the IBM® MarketScan® Supplemental and Coordination of Benefits Database (Medicare Supplemental Database).

The IBM® MarketScan® Commercial Database consisted of employer- and health plan-sourced data containing medical and drug data for several million individuals annually. It encompasses employees, their spouses, and dependents covered by employer-sponsored private health insurance. Health care for these individuals is available under a variety of fee-for-service (FFS), fully capitated, and partially capitated health plans. These include preferred provider

30 IBM Watson Health, "White Paper."

31 IBM Watson Health, "White Paper."

organizations (PPOs) and exclusive provider organizations (EPOs), point of service (POS) plans, indemnity plans, health maintenance organizations (HMOs), and consumer-directed health plans.[32]

The IBM® MarketScan® Medicare Supplemental Database was composed of data from retirees with Medicare supplemental insurance sponsored by employers or unions. In 2020, 1 million Medicare beneficiaries received their drug benefits through a retiree coverage plan.[33] The IBM® MarketScan® Medicare Supplemental Database included the Medicare-covered portion of payment, the employer-paid portion, and any patient out-of-pocket expenses. The database provided detailed cost and use data for health care services performed in both inpatient and outpatient settings.

The retail price data drawn from the IBM® MarketScan® Commercial Database and IBM® MarketScan® Medicare Supplemental Database had to meet several conditions in order to be included in the analysis:

1. Claimant must be age 50 or older.
2. Claim must have a value of greater than zero in the following fields:
    a. Total payment amount
    b. Metric quantity
    c. Ingredient cost
    d. Days' supply
    e. Average wholesale price
3. Payment amount cannot be less than 100 percent of the ingredient cost.
4. Claim must come from a noncapitated health plan.

IBM® Watson Health then combined the two databases and provided the AARP Public Policy Institute with data sets that included the monthly median (as well as the 25th and 75th percentile) retail price from January 2005 through December 2020 for all of the drug products in the *Rx Price Watch* market baskets. We then compiled the monthly median retail prices in spreadsheets designed to track price changes for each of the drug products in the AARP market baskets.

Calculating annual price changes for each drug

This *Rx Price Watch* report calculates average retail price changes for drug products in the following ways:

- The *annual point-to-point* percent change in retail price is the percent change in price for a given month compared with the same month in the previous year (e.g., January 2020 vs. January 2019, February 2020 vs. February 2019).
- The 12-month *rolling average* percent change in retail price is the average of the point-to-point changes over the preceding 12 months. For example, the average annual retail price changes for 2020 refer to the average of the annual point-to-point price changes for each of the 12 months from January 2020 through December 2020 compared with the same months in 2019.

We calculated average annual price changes for each drug product for each month and year that the drug was on the market from 2006 to 2020. The first step was to calculate the annual point-to-point percent change for each month by comparing the price in a specific month with

32 IBM Watson Health, "White Paper."

33 Shinobu Suzuki, Rachel Schmidt, and Eric Rollins, *The Medicare Prescription Drug Program (Part D): Status Report* (Washington, DC: Medicare Payment Advisory Commission, January 15, 2021).

the same month in the previous year (e.g., January 2020 vs. January 2019, February 2020 vs. February 2019). The next step was to calculate the average of these annual point-to-point changes for the 12 months in each calendar year. For example, average annual price changes for 2020 refer to the average of the annual point-to-point price for each of the 12 months in 2020. This 12-month rolling average tends to be a more conservative estimate of price changes than the point-to-point method (i.e., a simple percentage change for a single month from the same month in the previous year), and it accounts for seasonal variations in drug manufacturers' pricing policies.

Table A-1 shows how 12-month rolling average price changes are calculated. Suppose, for example, that drug A had the following pattern of price changes in 2020 when compared with the same month in 2019:

TABLE A-1

Average Annual Percent Change in Price for Hypothetical Prescription Drug A, 2020

Jan 19–Jan 20	Feb 19–Feb 20	Mar 19–Mar 20	Apr 19–Apr 20	May 19–May 20	Jun 19–Jun 20	Jul 19–Jul 20	Aug 19–Aug 20	Sep 19–Sep 20	Oct 19–Oct 20	Nov 19–Nov 20	Dec 19–Dec 20	Average
2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.67

In this example, the retail price of drug A was 2 percent higher than the price for the same months in the previous year, for the period from January through April 2020. A price hike in May increased the percentage difference to 3 percent for each of the subsequent months in 2020. The 12-month average of these price differences is

(2.0 + 2.0 + 2.0 + 2.0 + 3.0 + 3.0 + 3.0 + 3.0 + 3.0 + 3.0 + 3.0)/12, or 2.67 percent.[34]

Calculating aggregate average price changes across multiple drugs

To aggregate price changes for multiple drugs, we calculated a weighted average of price changes by weighting each drug's annual price change (calculated from the IBM® MarketScan® Commercial Database and the IBM® MarketScan® Medicare Supplemental Database, as shown in the hypothetical example in Table A-1) by its share of total 2018 prescription sales within its given market basket (i.e., brand name, generic, specialty, or combined). As an example, Table A-2 shows that the sample from which drug A was drawn has 10 drugs (we chose this small sample size to simplify this illustrative example). The second column of Table A-2 gives the average annual price change for each of these drugs, denoted as drugs A through J. A straight (or unweighted) average, which adds up individual values and divides by the number of drugs, would result in an average annual price change of 4.76 percent for the drugs in this hypothetical sample. Assuming the hypothetical changes in the dollar cost of therapy for these drugs, shown in the third column, the straight average change in the annual cost of therapy would be $236.13.

A *straight* average, however, does not account for the actual impact of price changes because it does not account for each product's "weight" (or share) within the sample (i.e., it gives equal weight to price changes of both commonly used drugs and drugs that are used less frequently). As a result, it does not accurately capture the average impact of price changes in the marketplace. In Table A-2, drugs with low price increases in percentage terms (drugs E and J) account for a small share (7 percent) of total 2018 sales for the specific group of drugs analyzed. By contrast, drugs with the highest percentage changes (drugs B, D, and I) account for a much larger share (37 percent) of sales. To reflect the relative importance of each drug's price change in the market

34 If the drug was introduced to the market in July of the previous year, then the price change for the given year is averaged using only the six months that the product was on the market in the previous year (i.e., July through December).

TABLE A-2

Average Changes in Price and Cost of Therapy for 10 Hypothetical Prescription Drugs, 2020

Drug Name	Unweighted Average Annual Price Change *(%)*	Unweighted Average Change in Cost of Therapy *($/year)*	Share of Total Sales	Weighted Average Annual Price Change *(%)*	Weighted Average Change in Cost of Therapy *($/year)*
A	2.67%	$623.48	15%	0.40%	$93.52
B	10.00%	$108.68	14%	1.40%	$15.22
C	2.67%	$433.68	7%	0.19%	$30.36
D	8.00%	$54.08	10%	0.80%	$5.41
E	1.50%	$162.76	5%	0.08%	$8.14
F	4.33%	$54.08	14%	0.61%	$7.57
G	6.40%	$216.84	2%	0.13%	$4.34
H	3.25%	$433.68	18%	0.59%	$78.06
I	7.80%	$27.04	13%	1.01%	$3.52
J	1.00%	$247.00	2%	0.02%	$4.94
TOTAL	**4.76%**	**$236.13**	**100%**	**5.22%**	**$251.07**

basket of products, we weighted each annual price change by the drug's share of total 2018 sales. In this simple example, the *weighted* average price increase in 2020 is the sum of

(Unweighted average price change for drug A × drug A's share of total sales) +
(Unweighted average price change for drug B × drug B's share of total sales) +
(Unweighted average price change for drug C × drug C's share of total sales) +
... + (Unweighted average price change for drug J × drug J's share of total sales),

or

$$(2.67 \times 0.15) + (10.0 \times 0.14) + (2.67 \times 0.07) + \ldots + (1.0 \times 0.02).$$

The results of this calculation are in the fifth column of Table A-2, which shows that the weighted annual average price change for the drugs is 5.22 percent, or approximately one-half a percentage point higher than the unweighted average of 4.76 percent. The weighted dollar change in the annual cost of therapy would be $251.07, compared with the unweighted average dollar change of $236.13.

Calculating average price changes across multiple drugs for years before 2018

The process for aggregating price changes for multiple drugs before 2018 is similar to that for 2018. Average price changes for 2006 through 2017 were derived by first calculating the rolling average annual price change for each drug (as shown in Table A-1), then weighting each drug's price change by its share of total sales in the sample. The weights used for all years in this study are from 2018 sales from the Medicare Part D plans of a Medicare Part D plan provider, including the AARP plans, as well as from the IBM® MarketScan® Commercial Database, and the IBM® MarketScan® Medicare Supplemental Database. The 2018 weights keep the market basket constant over time so that the change in prices would be a function of price changes alone and not a function of changes in market basket utilization or mix.

However, some drugs that were in the 2018 sample were not on the market in all earlier years. We dropped these drug products from the analysis in the month before they entered the market

and for all previous months, and recalculated the weights of the products present in the market before 2018 to reflect their relative share of the total sales as adjusted to reflect only drugs on the market during that period.

For example, suppose that drugs I and J in Table A-2 were not on the market in 2016. Furthermore, assume that total drug spending in 2018 was $100,000. To capture the loss of drugs I and J from the analysis for 2016, the weights are redistributed across the drugs that remain in the analysis (drugs A through H); the new weights are still based on their 2018 sales but as a share of total sales for the smaller number of drugs in the analysis for the year. In this example, the total 2018 sales of drugs on the market in 2016 would be $85,000 without drugs I and J. Drug A's $15,000 in sales, which represented 15 percent of sales for all 10 drugs, rises to 18 percent of sales when I and J are excluded. This weight, along with the analogous weights for drugs B through H, was used to derive the weighted average price change for 2016 (see Table A-3).

Weighting the previous years' price changes by 2018 sales potentially creates a bias relative to using each specific year's sales as the basis for assigning weights for that year. Using 2018 sales gives more weight to drugs that, relative to other drugs, had high rates of sales growth in 2018 or earlier years compared with the year analyzed. In general, however, newer drugs initially have higher rates of sales growth, but relatively lower rates of price growth, than do older drugs. This pattern occurs both because newer drugs may have been introduced at higher prices and because price increases for brand name drugs tend to accelerate in rate and amount closer to the end of a product's effective patent life.

TABLE A-3

Recalculating Weights When Prescription Drugs Drop Out of the Sample

Drug Name	2018 Weights		2016 Weights	
	Share of 2018 Sales	Dollar Value of 2018 Sales	2018 Dollar Sales of Drugs on Market in 2016	2018 Share of Drugs on Market in 2016
A	15%	$15,000	$15,000	18%
B	14%	$14,000	$14,000	16%
C	7%	$ 7,000	$ 7,000	8%
D	10%	$10,000	$10,000	12%
E	5%	$ 5,000	$ 5,000	6%
F	14%	$14,000	$14,000	16%
G	2%	$ 2,000	$ 2,000	2%
H	18%	$18,000	$18,000	21%
I	13%	$13,000	–	–
J	2%	$ 2,000	–	–
TOTAL	100%	$100,000	$85,000	100%

Calculating annual cost of therapy for a drug product

To assess the impact of price changes on dollars spent, we calculated an annual cost of therapy for each drug product. This annual cost of therapy analysis excludes drug products in the market basket that are used primarily for treatment of acute conditions or that are typically taken for a limited period of time. The amount of a drug that an average adult would take on a daily basis was determined using the "usual daily dose" reported in the Medi-Span Price Rx Pro® database. When this information was not available from Medi-Span, we used dosing information in the FDA-approved labeling for the drug product. The weighted average annual cost of therapy was

also calculated using the 2018 sales volumes to weight the annual cost of each drug product to produce the aggregate annual cost of therapy across all drug products in the study's market basket.

Defining manufacturer

We defined a drug manufacturer as the firm marketing the drug product under its corporate name in 2018. If a listed manufacturer is a division of another firm, we defined its drugs as marketed by the parent firm. This includes cases in which the firm marketing a drug product may have changed over time due to mergers and acquisitions, divestitures of specific drug products, or for other reasons. The analysis of drug manufacturers reported separately on manufacturers with at least two drug products (at the NDC level) among the most widely used drugs.

Defining therapeutic category

Drug products can be classified by the therapeutic purpose for which they are used. If a drug has multiple uses, the most common indication typically becomes the classifier. To group drug products in this study into similar therapeutic categories, we used Medi-Span's therapeutic coding scheme, known as the GPI code.

The therapeutic categories used in this study use an intermediate GPI-level code that specifies the groupings of similar chemical entities, such as "Proton Pump Inhibitors." A brand name therapeutic category may include drug products that are brand single source or brand multiple source.

Appendix B. Therapeutic Category Acronyms

Therapeutic Category	Definition
ACE Inhibitors/Combinations	**ACE** – Angiotensin-Converting Enzyme
Antidepressants, **SNRI**	**SNRI** – Serotonin–Norepinephrine Reuptake Inhibitor
Antidepressants, **SSRI**	**SSRI** – Selective Serotonin Reuptake Inhibitor
ARBs/ARB-Diuretic Combinations	**ARB** – Angiotensin-Receptor Blocker
H-2 Antagonists	**H-2** – Histamine 2

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