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Comparing U.S. and International Market Size and Average Pricing for Prescription Drugs, 2017-2022

KEY FINDINGS

- The U.S. made up about 50 percent of worldwide sales revenues but only 13 percent of total volume for prescription drugs in 2022 among countries covered in IQVIA MIDAS. Compared to other countries in the Organisation for Economic Co-operation and Development (OECD), the U.S. made up approximately 60 percent of sales revenues, but only 24 percent of the volume.
- Total sales revenues of prescription drugs in the U.S. grew from $582 billion in 2017 to $716 billion in 2022, a 23 percent increase—compared to only a 2 percent increase in the rest of world or OECD countries excluding the U.S.
- In 2022, this $716 billion represented approximately 2.8% of U.S. GDP, and the $417 billion in sales revenues of the OECD (excluding the U.S.) represented approximately 1.2% of GDP of the remaining OECD countries covered in the data.
- In 2022, the average price per unit in the U.S. was 5.5 times as high as in the OECD (excluding U.S.) and 7.7 times as high as the rest of the world (excluding U.S.)—representing both higher prices and a drug mix that skews towards higher cost drugs.
- Breaking results out by retail (e.g., pharmacies) and non-retail markets (e.g., hospitals and physician offices), the U.S. sales revenues grew similarly in each at 22 and 26 percent respectively. In contrast, both the rest of the world and OECD (excluding U.S.) shrunk in the retail market (-6 and -4 percent) but grew in the non-retail market (13 and 12 percent).
- Breaking results out by small molecule drugs and biologic products finds starkly different market trends. For small molecule drugs, U.S. sales revenues grew 4 percent, in contrast to contractions of -7 and -9 percent for rest of the world and OECD (excluding U.S.). For biologic products, the U.S. sales revenues grew 61 percent, compared to 39 and 33 percent for the rest of the world and OECD (excluding U.S.), respectively.
- Among the top 50 drugs, ranked based on U.S. sales revenues, the U.S. made up 75 percent of aggregate worldwide sales revenues and 21 percent of aggregate worldwide volume, in contrast to 50 percent of sales and 13 percent of volume when examining the sample of all drugs. This means that the U.S. has a disproportionate share of both spending and utilization on the highest revenue drugs as compared to its revenue and volume shares for the average drug.
- U.S. average price per unit for the top 50 drugs increased faster over time compared to the rest of the world. In 2017, U.S. average price per unit was 7.9 times world (excluding U.S.) average price and 5.7 times OECD (excluding U.S.) average price, but this increased such that by 2022, U.S. prices per unit were 11.9 times world (excluding U.S.) prices and 9.1 times prices in OECD (excluding U.S.) countries.

Introduction

The United States (U.S.) pays higher prices for prescription drugs than any other country in the world. Research using 2022 data found that prescription drug prices in the U.S. were 2.78 times as high as prices in 33 other Organisation for Economic Co-operation and Development (OECD) comparison countries.[1] This means that for every dollar paid in other countries for drugs, consumers in the U.S. pay $2.78.[1] The gap is widening over time as U.S. drug prices grow faster than drug prices in other countries and the mix of drugs changes.[1] There was, however, significant variation based on drug type. U.S. prices were 422 percent of prices in comparison countries for brand-name drugs, but U.S. prices were lower for unbranded generic drugs: Americans paid $0.67 for every dollar paid in comparison countries.**Error! Bookmark not defined.**

There are many reasons for these differences, including that the U.S. has substantial use of rebates and other discounts for brand drugs that are not reflected in manufacturer prices. For specific, heavily rebated drugs, the differential between U.S. gross and net prices can lead to further reductions. For example, research on insulin, one of the most highly rebated drugs in the U.S., found that in 2022 U.S. gross prices for insulin products were nearly ten times as high as prices in comparison countries.[2] However, after adjusting for U.S. rebates but not estimated rebates in other countries, for which data are generally unavailable, U.S. prices for insulin products were 233 percent of those in other countries.[2]

The primary goal of this brief is to examine trends related to market size measured via sales revenues and volume of prescription drug use between the U.S. and the rest of the world since 2017. Hence, in this brief, we compare the U.S. to the rest of the world (excluding the U.S.) and the other OECD countries (excluding the U.S.). We then present the average price calculated as aggregate sales revenues per unit sold. In contrast to other research, we do not use a price index to control for drug mix, so our average price per unit results may differ from other studies' results on international price differences that focused on price differences for identical drug products. We also do not control for the drug mix, because we focus our analysis on overall market size measures of revenues and volumes, which are a function both of the narrow price differences for each drug and the overall drug mix. As such, the focus of this brief is on sales revenues and volume of drugs sold, rather than aggregate price differences between the U.S. and the rest of the world. We will show that a disproportionately large share of total world revenues is for the U.S., highlighting that the U.S. is dominant in terms of total market share.

Methods

Data

The primary data for this analysis were IQVIA MIDAS[3], which include prescription drug data from worldwide healthcare markets, allowing for comparison of drug sales and volume (and hence prices) between the U.S. and other countries. IQVIA data for the U.S. market are derived from a panel of wholesalers, distributors, and pharmaceutical manufacturers that represent 90 percent of the pharmaceutical market and are projected to be nationally representative.[3] MIDAS collects comparable data for other countries as well, allowing for a drug-level comparison between countries. However, there is variability in the data coverage at the international level. For

[1] Mulcahy, A.W., Schwam, D., and Lovejoy, S.L. (2024) "International Prescription Drug Price Comparisons," RAND Research Report RR-2956-ASPEC, 2021. Available at: https://aspe.hhs.gov/sites/default/files/documents/277371265a705c356c968977e87446ae/international-price-comparisons.pdf

[2] Mulcahy, A.W. and Schwam, D. (2024). "Comparing Insulin Prices in the United States to Other Countries: Updated Results Using 2022 Data". https://aspe.hhs.gov/sites/default/files/documents/7ec40da6efd90a2a71cf3399a5b3b24d/insulin-price-comparisons.pdf

[3] Source of the data: IQVIA. U.S. National Data. <https://www.iqvia.com/insights/the-iqvia-institute/available-iqvia-data>.

example, MIDAS includes 100 percent of large pharmaceutical markets, such as France, Germany and Japan, but only 37 percent of the market in Colombia.[4] IQVIA, however, does use a projection methodology to make their estimates approximately nationally representative for countries with lower rates of direct data capture.

The data we examined covered 2017 through 2022. We evaluated prescription drug spending and volume of sales in the U.S. compared to 1) all countries represented in the MIDAS data and 2) the 33 other member countries of the OECD that are included in MIDAS database.[5] The first sample allows us to understand how much variation there is across the world, while the latter sample focuses on a set of high-income, comparison countries that are more similar to the U.S. in terms of their overall economy, based on indicators such as Gross Domestic Product (GDP) per capita.

Analytical Approach

Our two primary outcomes of interest were prescription drug spending and volume of prescription drugs sold. Prescription drug spending was measured in inflation-adjusted dollars.[6] The IQVIA dataset reports gross drug spending, meaning it does not include rebates. In the U.S. and many other countries, rebates can be used to substantially lower net sales prices for some drugs, and there may be differential use of these discounts between countries. The second outcome measure was volume of sales measured using "standard units." Standard units are calculated as a measure of the number of units sold of a drug by a manufacturer to a wholesaler or pharmacy. "Standard units" are not the same as "number of prescriptions" (generally there are many standard units in a given prescription), but represent the closest proxy (more details of the definition can be found in the Appendix).

Our primary sample of drugs included all prescription drugs used in the MIDAS dataset. We also examined several subgroups of interest. We stratified the data by where a prescription is dispensed – either in the retail setting or in non-retail settings. Retail drugs are those that are filled in an outpatient setting. Depending on a country's health care institutions and organizations, this can include settings such as chain drugstores, independent pharmacies, government-run pharmacies, and mail order prescriptions. Non-retail drugs were defined as those administered in an inpatient setting. Depending on the country, this typically includes drugs administered in a hospital or by all other dispensing providers (such as drugs administered in clinics, physician offices, long-term care facilities, and home health).[7] As we have shown in a previous brief, non-retail spending on prescription drugs was one of the fastest drivers of prescription drug spending in the U.S. Thus, capturing this sector is critical to understanding current prescription drug spending trends.[8]

[4] These data come from IQVIA's assessment of the representativeness of their data.

[5] The 34 countries are: Australia, Austria, Belgium, Canada, Chile, Colombia, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and the United States of America. MIDAS does not cover four OECD countries: Costa Rica, Denmark, Iceland, and Israel.

[6] The variable we use for revenues is measured in U.S. dollars. We then applied the GDP deflator to create a standardized price measured in U.S. dollar equivalents standardized for inflation based on quarter 1, 2023 dollars. By adjusting for inflation, the data represent a "real" dollar. The data represent the value of a real dollar as of quarter 1 of 2023. Source: U.S. Bureau of Economic Analysis, Gross Domestic Product: Implicit Price Deflator [GDPDEF], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/GDPDEF.

[7] Retail drugs can be subject to rebates while non-retail drugs typically do not have rebates. As a result, retail drug spending may be overestimated relative to non-retail spending.

[8] Parasrampuria, S. and Murphy, S. Trends in Prescription Drug Spending, 2016-2021. Washington, DC: Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services. September 2022. https://aspe.hhs.gov/reports/trends-prescription-drug-spending

We also examined small molecule drugs and biological products separately, because these markets tend to be distinct with regard to their underlying regulation, cost structures, and hence also their level of market competition and prices.[9] Small molecule drugs are made using chemical processes, while biological products are generally large, complex molecules that may be produced through biotechnology in a living system, such as a microorganism, plant cell, or animal cell. Examples include therapeutic proteins (such as filgrastim, which treats low white blood cell count), monoclonal antibodies (such as adalimumab, which treats autoimmune conditions), and vaccines (such as those for influenza, tetanus, or COVID-19).[10]

Finally, we examined the top 50 drugs ranked based on total sales revenue in the U.S. market. We identified the top 50 drugs separately in each year to allow for changes in drug composition (for example, biological products were becoming an increasing proportion of these drugs throughout this time period). This analysis of the top 50 drugs allows us to assess trends in drug sales, volumes, and pricing among the highest cost products, which has become an issue of significant public policy debate in the U.S.

Data Limitations

There are several limitations to our data. MIDAS is an international database, however there is some variation in coverage depending on the country. As such, there may be gaps in the international data. We mitigate this limitation by relying on aggregate estimates across many countries, rather than relying on single country comparisons. In addition, since the data are ex-manufacturer level, they allow us only to observe the prices paid by health care systems rather than by patients. However, the pharmaceutical supply chain is interconnected and complex, involving pharmaceutical manufacturers, wholesalers and distributors, hospitals and clinics, pharmacies and pharmacy benefit managers, insurance plans, and patients. Because we are not able to observe all the components in the supply chain, we cannot examine certain transactions that would impact drug prices. For example, health insurance plans or pharmacy benefit managers are likely to utilize their bargaining power in multiple ways to employ formularies or utilization management tactics to impact price negotiation or differential rebates that would not be observable in the data. We note that to the extent that unobserved rebates (measured as a percentage of our ex-manufacturer transaction prices) differ significantly between the United States and other countries may modulate to some extent our cross country comparisons of average pricing or market size measured via sales revenues. To get an rough estimate of this potential effect, we cite the research literature that has found that in the U.S. rebates are estimated to be approximately 23% - 28%[11,12,13] of wholesale drug pricing. Since rebates also exist in other countries—albiet perhaps at a lower average proportion than in the U.S.—a lower bound estimate for how much the U.S. pays in sales revenue or in average pricing relative to other countries can be estimated by adjusting our estimates downward by this 23% - 28% for the U.S. and leaving the other countries unadjusted. Also, note that much of our analysis is focused on comparing percentage changes through time between the U.S. and other countries and that the potential differences in average rebate proportion across countries should not impact those calculations.

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[9] Parasrampuria, S. and Murphy, S. Competition in Prescription Drug Markets, 2017-2022. Washington, DC: Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services. December 2023. https://aspe.hhs.gov/reports/competition-prescription-drug-markets

[10] U.S. Food and Drug Administration. Biological Product Definitions. https://www.fda.gov/files/drugs/published/Biological-ProductDefinitions.pdf

[11] Mulcahy, A.W., Whaley, C., Tebeka, M.G., Schwam D., Edenfield, N., Becerra-Ornelas, A.U., International Drug Price Comparisons. RAND Corporation, January 2021.

[12] Charles Roehrig, The Impact of Prescription Drug Rebates on Health Plans and Consumers, Ann Arbor, Mich.: Altarum Institute, April 2018.

[13] IQVIA Institute for Human Data Science, Medicine Use and Spending in the U.S.: A Review of 2018 and Outlook to 2023, Durham, N.C., May 9, 2019b.

Results

Total Spending Trends

Table 1 shows total prescription drug sales and volume in the U.S. and the two comparison groups: the rest of the world and OECD countries (excluding U.S.). On average, the U.S. made up approximately 50 percent of worldwide sales but only 13 percent of total volume. Similarly, the U.S. made up approximately 60 percent of sales in the OCED, but only 24 percent of the volume.

Total sales of prescription drugs in the U.S. grew from $582 billion in 2017 to $716 billion in 2022, a 23 percent increase.[14] This rate of growth in the U.S. was much higher than that for prescription drug sales in the rest of the world which experienced only 2 percent growth. Similarly, the U.S. rate of growth was much higher than that of OECD countries (excluding the U.S.) which also experienced only 2 percent growth. While the U.S. saw a starkly larger rate of growth from 2017 – 2022 in sales revenues as compared to the rest of the world and OECD, it actually found a slightly lower rate of growth in our volume measure. Specifically, the U.S. grew 8 percent in volume over the sample period whereas the world (excluding U.S.) grew 13 percent, and the OECD (excluding U.S.) grew 10 percent. Overall, prescription drug market size measured via both sales revenues and volumes increased over the past six years across each of our geographic subsamples, however the magnitude of the growth in sales revenues in the U.S. was an outlier both in comparison to the sales revenue trends in the rest of the world, the rest of the OECD, as well as in relation to the volume growth trends. This suggests that average price measured as aggregate sales revenues per unit has changed through time, which we investigate below.

Table 1. Prescription Drug Sales and Volume, 2017-2022

	United States		World Excluding U.S.		OECD Excluding U.S.		U.S. As % of OECD	
	Sales, $	Volume	Sales, $	Volume	Sales, $	Volume	Sales, %	Volume, %
2017	582	244	629	1,622	409	776	58.7	23.9
2018	606	245	633	1,662	425	789	58.8	23.7
2019	633	250	649	1,716	425	807	59.8	23.6
2020	672	251	658	1,698	440	801	60.4	23.9
2021	698	256	702	1,766	464	820	60.0	23.8
2022	716	264	643	1,829	417	852	63.2	23.6
% Change 2017 - 2022	23%	8%	2%	13%	2%	10%	8%	-1%

Source: ASPE analysis of IQVIA MIDAS Data

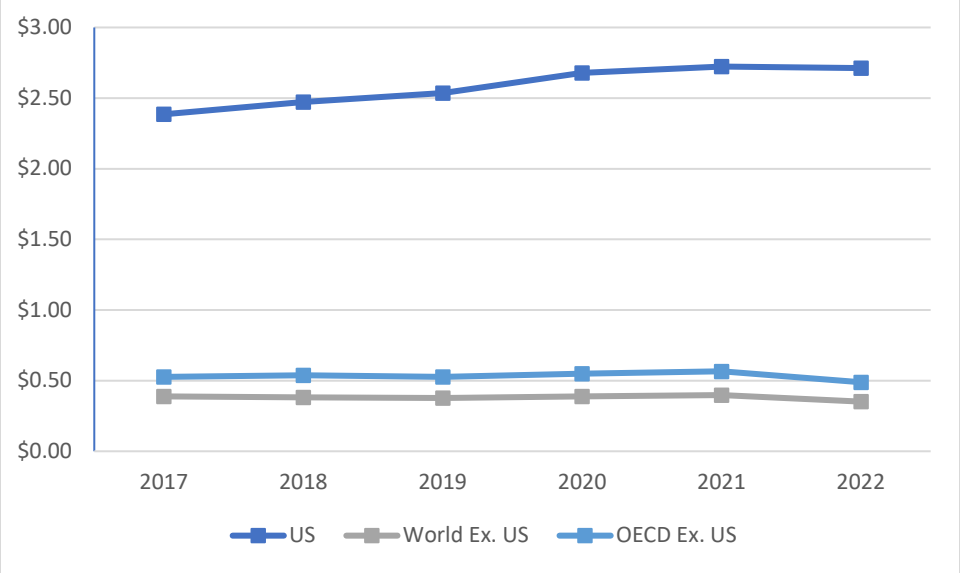
Notes: All values, are either billions of dollars or billions of Standard Units. Sales revenues are measured in inflation adjusted U.S. dollars using the U.S. GDP Deflator based on Q1 2023. The "World Excluding U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Excluding U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

While the focus of this report is on market size measures of sales revenues and volumes, nevertheless the stark results regarding U.S. revenue trends found above give reason to further investigate average price trends. Hence, in Figure 1 we also present changes over time in the average price per unit across all drugs in each of our geographic samples. Here we calculate a simple average price by dividing aggregate sales revenues by aggregate

[14] This estimate may be different from other sources that use a different methodology. For example. the Centers for Medicare & Medicaid Services' National Health Expenditures estimate focuses solely on retail prescription drugs, meaning their estimates are lower, because this brief includes both retail and non-retail drugs.

volumes for each geographic sample in each year. We find that the U.S. has seen an average price increase of 14 percent between 2017 and 2022 as compared to decreases of 9 percent and 7 percent in the world (excluding U.S.) and OECD (excluding U.S.) samples respectively. Note that this approach of tracking average aggregate price and comparing across geographic samples is not directly comparable to other analyses based on price index methods which control for differential (and changing) drug mix as a separate phenomenon from price changes. Nevertheless, examining the ratio of average prices, we observe that by 2022, prices in the U.S. were 5.5 times those in the OECD (excluding the U.S.) and 7.7 times prices in the rest of the world (excluding the U.S.). In comparison, other ASPE work utilizing price index methods found a U.S. to OECD price ratio of 2.8 (compared to 5.5 here), implying that in addition to higher prices for the same drug that the U.S. has a drug mix that additionally skews towards more expensive drug compounds.[15] Finally, we note that the generally low seeming price levels observed are a result of our calculations being per "standard unit" as opposed to "per prescription," and that there are generally many "standard units" per prescription.

Figure 1. Average Price Per Unit Sold Across all Drugs, 2017-2022



Source: ASPE analysis of IQVIA MIDAS Data
Notes: Prices are calculated based on underlying sales revenues that are measured in inflation adjusted U.S. dollars using the U.S. GDP Deflator based on Q1 2023. The "World Ex. U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Ex. U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

Location of Sale

We then examined trends broken out by retail and non-retail drugs. In Table 2, we observe changes in sales over time separately for retail drugs versus non-retail drugs. In the U.S. sample there were substantial increases in sales revenues for both retail drugs (22 percent), and non-retail drugs (26 percent). In contrast, in both the world (excluding US) sample and the OECD (excluding US) sample, the retail sales revenues actually decreased

[15] Mulcahy, A.W., Schwam, D., and Lovejoy, S.L. (2024) "International Prescription Drug Price Comparisons," RAND Research Report RR-2956-ASPEC, 2021. Available at: https://aspe.hhs.gov/sites/default/files/documents/277371265a705c356c968977e87446ae/international-price-comparisons.pdf

over the sample period by 6 and 4 percent respectively, but non-retail sales still rose by 13 and 12 percent respectively. Across all geographic samples, despite seeing larger growth rates in non-retail sales than in retail sales from 2017 – 2022, in 2022, non-retail sales accounted for a minority share of 28, 46, and 40 percent for the U.S., world (excluding U.S.), and OECD (excluding U.S.) respectively. The corresponding volume of prescriptions can be found in Appendix Table 1.

Table 2. Sales of Drugs Based on Location of Sale, 2017-2022

	Retail, $Billions				Non-Retail, $Billions			
	U.S.	World Ex. U.S.	OECD Ex. U.S.	U.S. as % of OECD	U.S.	World Ex. U.S.	OECD Ex. U.S.	U.S. as % of OECD
2017	420	366	259	61.9	162	263	151	51.9
2018	431	356	265	61.9	175	277	160	52.2
2019	447	354	262	63.1	186	295	163	53.3
2020	478	356	269	64.0	193	302	172	53.0
2021	495	373	279	63.9	203	330	185	52.3
2022	512	345	248	67.3	204	298	168	54.9
% Change 2017 - 2022	22%	-6%	-4%	9%	26%	13%	12%	6%

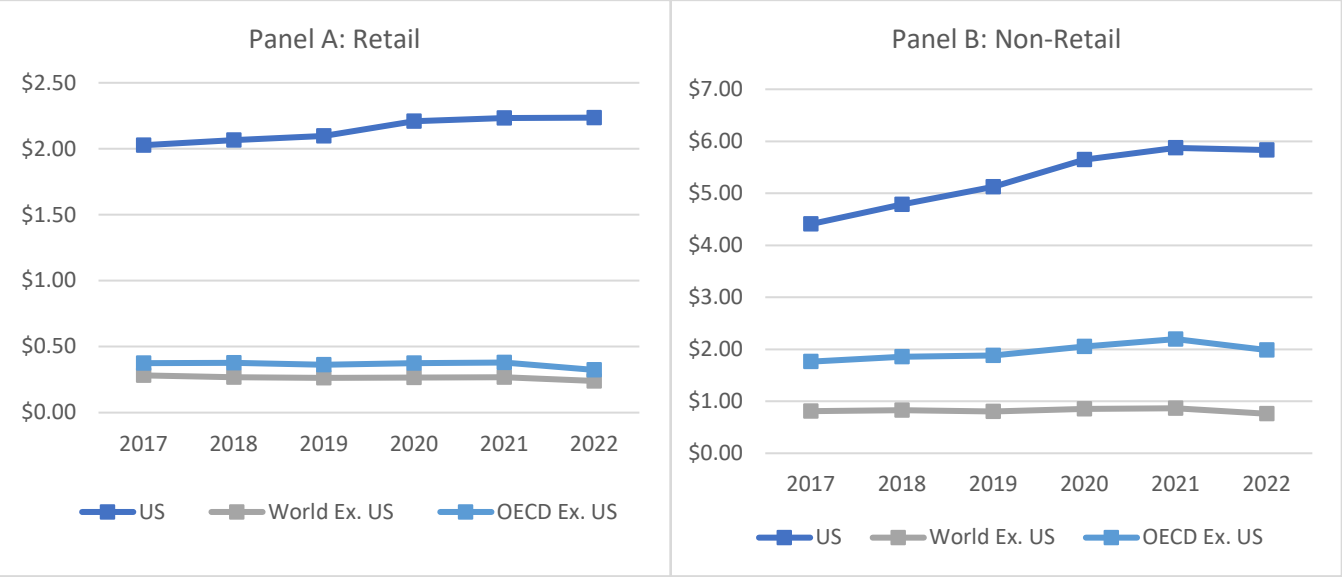
Source: ASPE analysis of IQVIA MIDAS Data

Notes: All values are in billions of dollars. Sales revenues are measured in inflation adjusted U.S. dollars using the U.S. GDP Deflator based on Q1 2023. The "World Ex. U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Ex. U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

In Figure 2, we present trends in the average price per unit for retail (panel A) and non-retail drugs (panel B) over time for each of our comparison groups. Beginning first with Panel A showing retail average price trends, we see that between 2017 and 2022, the US average price increased by approximately 10 percent, while the world (excluding U.S.) and OECD (excluding U.S.) decreased by 15 and 14 percent respectively. In the non-retail market (compared to the retail market) we observe larger percentage price increases (or lesser price decreases) for all geographic samples. For example, in the U.S. the average price increased by 32 percent, whereas the world (excluding U.S.) decreased by 7 percent and the OECD (excluding U.S.) increased by 13 percent.

Moving from examining price trends through time to comparing price levels across samples, we find that non-retail prices are generally higher than retail prices and that U.S. prices were higher than world and OECD (excluding U.S.) prices for both retail and non-retail drugs. For example, in 2022, non-retail prices were more than double retail prices per unit for all geographic samples: U.S. non-retail prices were 2.6 times U.S. retail prices ($5.83 versus $2.24 per unit); world (excluding U.S.) non-retail prices were 3.2 times as high as world (excluding U.S.) retail prices ($0.76 versus $0.24 per unit), and OECD (excluding U.S.) non-retail prices were 6.2 times OECD (excluding U.S.) retail prices ($1.99 versus $0.32). Finally, comparing the price levels across geographic samples but within channel type, we see that in 2022, U.S. retail prices were 9.3 times world (excluding U.S.) retail prices, and 6.9 times OECD (excluding U.S.) retail prices and U.S. non-retail prices were 7.7 times world (excluding U.S.) non-retail prices and 2.9 times OECD (excluding U.S.) non-retail prices.

Figure 2. Average Price Per Unit Sold for Retail and Non-Retail Drugs, 2017-2022



Source: ASPE analysis of IQVIA MIDAS Data.
Notes: Sales revenues that are measured in inflation adjusted U.S. dollars using the U.S. GDP Deflator based on Q1 2023. The "World Ex. U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Ex. U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

Small Molecule Drugs vs. Biologic Products

Table 3 shows trends in sales for each of the U.S., world (excluding U.S.), and OECD (excluding U.S.) samples broken out for small molecule drugs and biological products. We observe very large differences in trends between the small molecule drugs and biological products samples. For small molecule drugs, there was a 4 percent increase in sales revenues in the U.S. between 2017 and 2022, while the world (excluding U.S.) and OECD (excluding U.S.) experienced 7 and 9 percent decreases, respectively. In contrast, for biological products, there was a 61 percent increase in sales revenues in the U.S. and a 39 and 33 percent increase in sales for the world (excluding U.S.) and OECD (excluding U.S.), respectively. Taken as a whole, it is clear that the relative revenue share of small molecule drugs has been decreasing over this 6-year time span, while the sales share of biological products has been increasing. However, examining the prescription drug market overall, the majority of sales remain on small molecule drugs. In 2022, 57 percent of U.S. drug sales revenue, 73 percent of world (excluding U.S.) drug sales, and 67 percent of OECD (excluding U.S.) sales were for small molecule drugs. The corresponding volume can be found in Appendix Table 2.

Table 3. Worldwide Sales of Drugs Based on Type of Drug, 2017-2022

	Small Molecule Drugs, $Billions				Biologic Products, $Billions			
	U.S.	World Ex. U.S.	OECD Ex. U.S.	U.S. as % of OECD	U.S.	World Ex. U.S.	OECD Ex. U.S.	U.S. as % of OECD
2017	388	504	307	55.8	194	125	102	65.5
2018	387	495	311	55.4	219	138	114	65.8
2019	388	500	305	56.0	245	149	120	67.1
2020	407	496	309	56.8	265	163	132	66.8
2021	411	519	319	56.3	287	183	146	66.3
2022	405	469	280	59.1	311	173	136	69.6
% Change 2017 - 2022	4%	-7%	-9%	6%	61%	39%	33%	6%

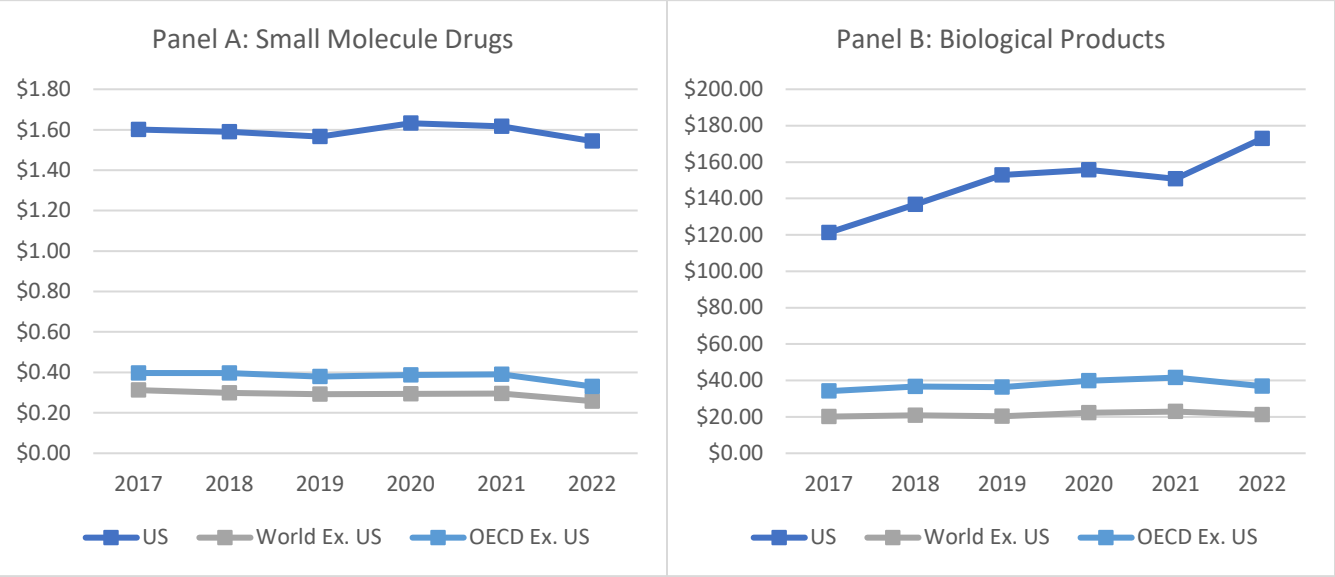
Source: ASPE analysis of IQVIA MIDAS Data

Notes: All values are in billions of dollars. Sales revenues are measured in inflation adjusted U.S. dollars using the U.S. GDP Deflator based on Q1 2023. The "World Ex. U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Ex. U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

Figure 3 shows trends in the average price per unit of small molecule drugs (Panel A) and biological products (Panel B) from 2017 through 2022. The first main takeaway is that the average price per unit for small molecule drugs is much lower than that for biologic drugs for all geographic samples. Using 2022 as an example we find: U.S.: $1.54 vs. $173.00; world (excluding U.S.): $0.26 vs $21.13; and OECD (excluding U.S.): $0.33 vs. $36.81).[16] The second main takeaway is that average small molecule drug prices per unit are decreasing over time whereas those for biologics are increasing (U.S.: -4% vs. +43%, world (excluding U.S.): -17% vs +5%, and OECD (excluding U.S.): -17% vs. +8%). Comparing price ratios in 2022, U.S. prices were 6.0 times the world (excluding U.S.) small molecule drug prices and 4.7 times biologic product prices. In comparison to the OECD (excluding U.S.) the U.S. small molecule drug prices were 8.2 times as high and biologic product prices 4.7 times as high. As earlier in the report, these price ratios are larger than what a price index comparison would calculate since they combine both the price effect of identical drugs as well as the differential (and changing) drug mix.

[16] The dramatic price differences between small molecule drugs and biological products is, in part, because of differences in how "standard units" are measured by the MIDAS data. Most small molecule drugs are oral pills versus biological products tend to be injections and MIDAS uses a different approach for converting these volumes to "standard units". Please see the appendix for more details on how "standard units" are calculated by MIDAS.

Figure 3. Average Price Per Unit Sold for Small Molecule Drugs and Biological Products, 2017-2022



Source: ASPE analysis of IQVIA MIDAS Data.
Notes: Prices are calculated based on underlying sales revenues that are measured in inflation adjusted U.S. dollars using the U.S. GDP Deflator based on Q1 2023. The "World Ex. U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Ex. U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

Top 50 Drugs Based on U.S. Prices

In the second portion of this report, we examine the top 50 drugs ranked based on total U.S. sales revenue. As described above, the top 50 drugs are reidentified each year to allow for changes in drug composition as new drugs come to market and older drugs go off patent and face generic or biosimilar price competition. Table 4 shows that in 2022, the U.S. made up 75 percent of worldwide sales for these top 50 drugs ($386 billion out of a total of $516 billion), in contrast to approximately 50 percent across all drugs as found earlier in Table 1. Similarly, in terms of the market dominance of the U.S. as a fraction of the OECD for these top 50 drugs, we find that in 2022, the U.S. made up 78 percent of the OECD sales compared to 63 percent for the full sample used in the first half of the report. Moreover, the U.S.' dominance among the top 50 drugs has grown over the sample period as the U.S. share of worldwide sales has grown from 70 percent to 75 percent, and its share of OECD sales has grown from 73 percent to 78 percent. These results underscore the disproportionate market significance of the U.S. for the top 50 drugs ranked by U.S. sales revenues.

Because U.S. prices are on average higher than prices in other countries, the U.S. share of volume is lower – at 21 percent of total world volume for these top 50 drugs (12 billion units sold from a total of 58 billion units). The U.S.' 21 percent of world volume for these top 50 drugs is still larger than the U.S. average share of volume across all drugs (13 percent), underscoring that the top 50 drugs by U.S. sales revenues involve not only disproportionately higher average U.S. prices but also higher average U.S. volume utilization.

There has been a substantial decrease in volume for the top 50 drugs over time—a 62 percent decline in the U.S. and a 54 percent decline in the world (excluding U.S.) and a 53 percent decline in the OECD (excluding U.S.). This volume contraction is likely predominantly explained by the changing composition of drugs in the top 50 revenue drugs, as total expenditures for biologic drugs have rapidly risen, in combination with the fact that the average volumes are much lower for biologic products than for small molecule drugs (see for example Appendix

Tables 5 and 6). In comparison to the observed volume contractions of the Top 50 drug cohort, there were substantial increases in sales revenues of 48 percent in the U.S. and 17 percent in the world (excluding U.S.) and 14 percent in the OECD (excluding U.S.). This means there has been a trend towards higher prices for these drugs, which may come both from price changes and also from changing drug mix due to the launch and scaling up of new drugs. Notably, since the U.S. sees both the largest increase in revenues as well as the largest decline in volume, average prices must have increased the most significantly for the U.S. among these geographical samples.

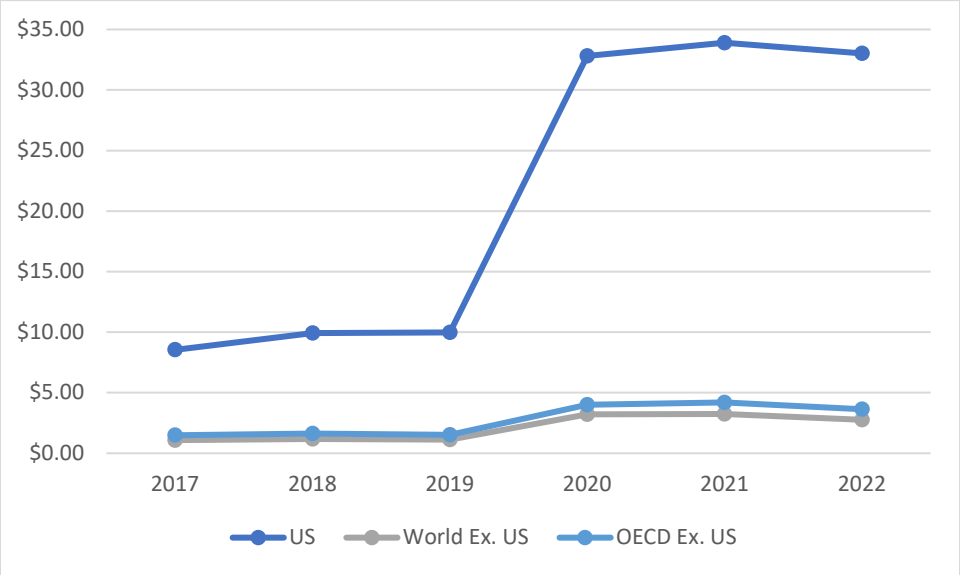
Table 4. Prescription Drug Sales and Volume for the Top 50 Drugs Based on U.S. Sales, 2017-2022

	United States		World Excluding U.S.		OECD Excluding U.S.		U.S. % of OECD	
	Sales, $	Volume	Sales, $	Volume	Sales, $	Volume	Sales, %	Volume, %
2017	261	31	111	102	96	64	73.1	32.2
2018	276	28	118	100	102	63	73.1	30.8
2019	294	30	119	105	101	67	74.5	30.7
2020	328	10	124	39	106	27	75.6	27.4
2021	356	11	134	41	114	27	75.8	27.9
2022	386	12	130	47	110	30	77.9	27.9
% Change 2017 - 2022	48%	-62%	17%	-54%	14%	-53%	7%	-13%

Source: ASPE analysis of IQVIA MIDAS Data
Notes: All values are in billions of dollars or billions of Standard Units. Sales revenues that are measured in inflation adjusted U.S. dollars using the U.S. GDP Deflator based on Q1 2023. The "World Excluding U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Excluding U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

As suggested in Table 4, a decrease in volume and an increase in sales suggests higher prices per unit sold, which we formally display in Figure 4. Here we see that there was a large jump in average prices across all geographic markets between 2019 and 2020, which was driven by a moderate increase in sales and a large drop off in volume (as seen above in Table 4). In 2017, U.S. prices were 7.9 times the world (excluding U.S.) prices and 5.7 times the OECD (excluding U.S.) prices, but this increased such that by 2022, U.S. prices were 11.9 times the world (excluding U.S.) prices and 9.1 times prices in OECD (excluding U.S.) countries. This large change in relative average prices seems to be predominantly driven by the change from 2019 to 2020.

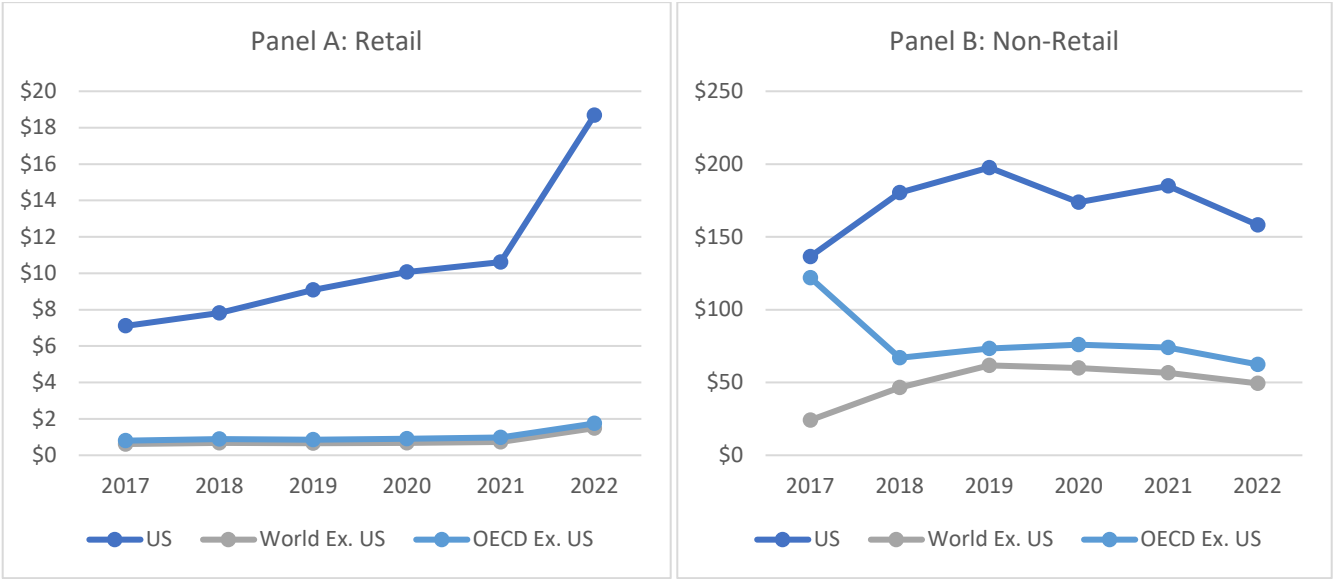
Figure 4. Average Price Per Unit for Top 50 Drugs by U.S. Sales, 2017-2022



Source: ASPE analysis of IQVIA MIDAS Data.
Notes: Prices are calculated based on underlying sales revenues that are measured in inflation adjusted U.S. dollars using the U.S. GDP Deflator based on Q1 2023. The "World Ex. U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Ex. U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

The last figure shows average price per unit sold among the top 50 drugs based on subgroups, including retail and non-retail drugs (each subgroup has a sample size of 50 drugs, for example the "retail" subgroup is based on the top 50 revenue retail drugs in the U.S.). In Figure 5, we observe changes over time in the top 50 retail (panel A) and top 50 non-retail (panel B) drug prices. Comparing across the two subgroups, the primary finding is that while the trends from 2017 through 2022 in retail prices grew roughly proportionately across the geographic samples, non-retail price growth notably differed among them. For example, in the U.S. non-retail prices increased by 16 percent, in the world (excluding U.S.) prices increased by 104 percent, but in the OECD (excluding U.S.), average price decreased by 49 percent. As a result, the prices in 2022 converged much more than in the sample of all non-retail drugs used in the first half of the report. Hence, U.S. non-retail prices were only 3.2 times world (excluding US) prices (compared to 7.7 times as high for the sample of all non-retail drugs used in the first half of the report) and 2.5 times OECD (excluding US) prices (compared to 2.9 for the sample of all non-retail drugs used in the first half of the report).

Figure 5. Average Price Per Unit Sold for Top 50 Retail and Non-Retail Drugs by U.S. Sales, 2017-2022

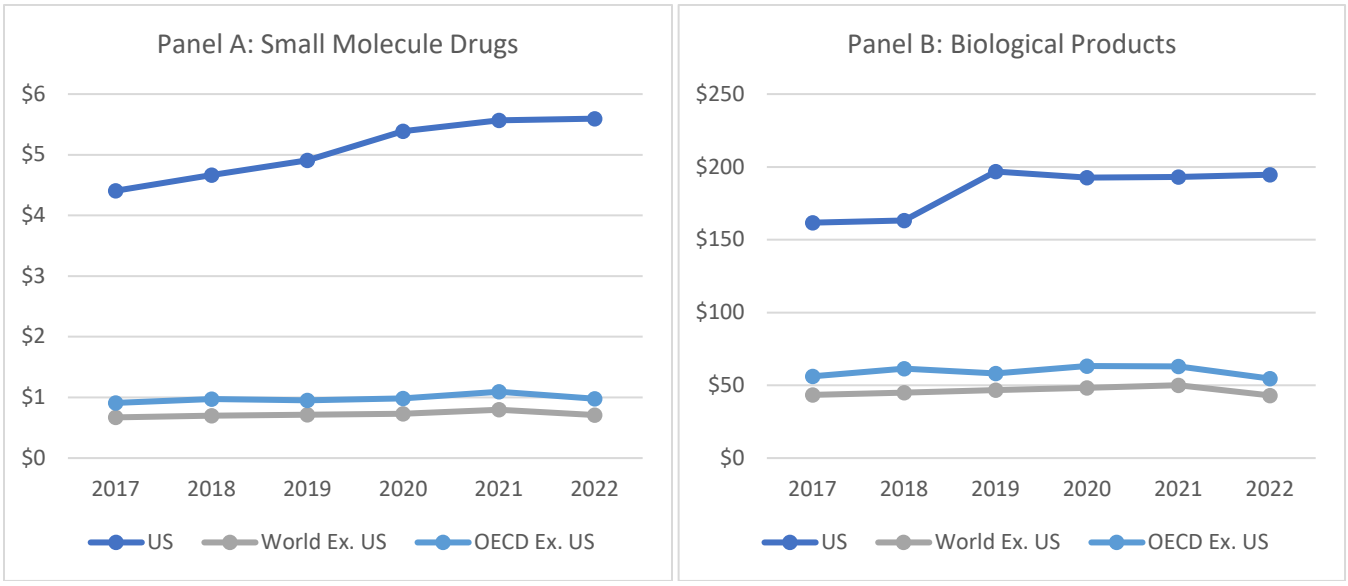


Source: ASPE analysis of IQVIA MIDAS Data.
Notes: Prices are calculated based on underlying sales revenues that are measured in inflation adjusted U.S. dollars using the U.S. GDP Deflator based on Q1 2023. The "World Ex. U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Ex. U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

Finally, in Figure 6, we perform a similar decomposition examining trends in average price per unit of the top 50 small molecule drugs (panel A) and top 50 biologic products (panel B) separately ranked by U.S. sales revenues.[17] In panel A we see that average prices for the top 50 small-molecule drugs increased from 2017 – 2022 in all geographic samples but increased most in the U.S. at 27 percent. By comparison, the world (excluding U.S.) average small molecule drug prices increased only 6 percent, and in the OECD (excluding U.S.) increased by 7 percent. In panel B, we see that average prices for the top 50 biologic products increased from 2017 – 2022 in the U.S. (by 20 percent), but actually slightly decreased by 1 percent and 3 percent respectively in the world (excluding U.S.) and OECD (excluding U.S.) geographic samples.

[17] As mentioned above, the dramatic price differences between small molecule drugs and biological products are, in part, because of differences in how "standard units" are measured by the MIDAS data. Most small molecule drugs are oral pills, whereas biological products tend to be injections and MIDAS uses a different approach for converting these volumes to "standard units". Please see the appendix for more details on how "standard units" are calculated by MIDAS.

Figure 6. Average Price Per Unit Sold for Top 50 Small Molecule Drugs and Top 50 Biological Products by U.S. Sales, 2017-2022



Source: ASPE analysis of IQVIA MIDAS Data.
Notes: Prices are calculated based on underlying sales revenues that are measured in inflation adjusted U.S. dollars using the U.S. GDP Deflator based on Q1 2023. The "World Ex. U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Ex. U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

Conclusion

This report sought to provide an updated analysis about the relative market characteristics of the U.S. vis-à-vis the rest of the world and the OECD as it relates to prescription drug spending, volume utilization, and average pricing. We found that the U.S. makes up approximately 50 percent of worldwide drug sales revenues and 13 percent of volume utilization—starkly demonstrating the disproportionate significance of the U.S. in terms of revenue contribution to the world pharmaceutical market. We also found that ongoing trends in market growth differed between the U.S. and the rest of the world, where U.S. sales revenues grew by 23 percent overall during the sample period, in comparison to only 2 percent in each of the rest of the world and the rest of the OECD. This implies we should expect the market significance and concomitant cost burden of the U.S. to continue to grow going forward.

Our analysis was also able to disaggregate differences between the U.S., the rest of the world, and the OECD by important market characteristics, such as location of sale (retail vs. non-retail drugs) and by drug type (small molecule vs. biologic). While the U.S. revenue market grew similarly in the retail and non-retail sectors at 22 and 26 percent respectively, the rest of the world and the rest of the OECD differed with market contractions of -6 and -4 percent in the retail sector but positive growth of 13 and 12 percent in the non-retail sector, respectively. Thus, while we find overall growth in the non-retail sector across the board, the U.S. was anomalous in the strong growth of the retail sector. Disaggregating our analysis by drug type showed that there is a large dichotomy between small molecule drugs and biologics. Small molecule drugs saw revenue market growth rates that were either low or negative, while biologic markets saw large growth rates in all geographic markets of 61, 39, and 33 percent—highlighting the importance of the rise of biologic markets worldwide, but with the strongest growth in the U.S.

We also found that, on average, there is higher per capita volume use of drugs in the U.S. than the rest of the world (when viewed as an aggregate). Unlike with drug prices, this trend was consistent across all drug types. While we cannot test it directly, this suggests that the U.S. may have greater access to prescription drugs—at least along some dimensions—such as in terms of the number of drugs brought to market, or how early a given drug is launched in each country. Nevertheless, revenue shares of the U.S. remained disproportionately large compared to volume shares implying that the U.S. pays more on average per unit of prescription drugs. Average U.S. drug prices have been, and continue to be, higher than the rest of the world. However, this report demonstrated that there is variation in the magnitude of difference depending on the type of drug. Finally, we found that price per unit growth trends also varied by type of drug and location of sale and across geographic markets.

A limitation of this analysis is that we cannot measure patient affordability of prescription drugs. As other studies have noted, this study also found that purchase prices by the health care system are higher in the U.S. relative to international comparisons, but historically we have not known the prices paid for drugs by insurance plans or beneficiaries in the U.S. or the rest of the world. That is beginning to change, for example, the amounts paid by Medicare and Medicaid for drugs is known and the Consolidated Appropriations Act, 2021 provides some information on drug prices in the private market.[18] While all of these data are not easily accessible or always publicly available, it is progress towards price transparency. It is possible that patient affordability may follow different trends than purchase prices.

Taken together, this brief underscores that U.S. drug revenue and volume is significantly higher than in the rest of the world as well as to comparison OECD countries. One of the primary reasons is that the U.S. also has a differential mix of drugs, skewed towards higher priced drugs. As a result, the U.S. is particularly dominant among the top ranked revenue drugs, where both U.S. utilization volume and price per unit are disproportionately larger than other countries.

[18] On the private market, see https://www.congress.gov/116/plaws/publ260/PLAW-116publ260.pdf, Division BB, Sec. 204 (135 Stat. 2918-22) and https://www.cms.gov/marketplace/about/oversight/other-insurance-protections/prescription-drug-data-collection-rxdc.

Appendix

Definition of standard unit: "The number of standard 'dose' units sold. It is determined by taking the number of counting units sold divided by the standard unit factor which is the smallest common dose of a product form as defined by IQVIA. For example, for oral solid forms the standard unit factor is one tablet or capsule whereas for syrup forms the standard unit factor is one teaspoon (5 ml) and injectable forms it is one ampoule or vial. Standard units should be used when the packs or products being compared are different in form." This definition is not synonymous with "prescriptions," which is often a more typical unit of analysis and therefore our price per unit calculations may seem lower than other research that uses prescriptions. However, the advantage of this definition is that it is standardized across the world, so our results allow for cross country comparisons.

The data in Appendix Table 1, in combination with the data in Table 2, allow for calculation of values in Figure 2.

Appendix Table 1. Worldwide Volume of Drugs Based on Location of Sale, 2017-2022

	Retail Volume			Non-Retail Volume		
	U.S.	World Ex. U.S.	OECD Ex. U.S.	U.S.	World Ex. U.S.	OECD Ex. U.S.
2017	207	1,298	691	37	324	85
2018	209	1,327	703	37	334	86
2019	213	1,348	720	36	368	87
2020	217	1,343	717	34	355	84
2021	222	1,385	736	35	381	84
2022	229	1,437	768	35	392	85
% Change 2017 - 2022	11%	11%	11%	-5%	21%	-1%

Source: ASPE analysis of IQVIA MIDAS Data.
Notes: All values are in billions of Standard Units. The "World Ex. U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Ex. U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

The data in Appendix Table 2, in combination with the data in Table 3, allow for calculation of values in Figure 3.

Appendix Table 2. Worldwide Volume of Drugs Based on Type of Drug, 2017-2022

	Small Molecule Drugs, Volume			Biologic Products, Volume		
	U.S.	World Ex. U.S.	OECD Ex. U.S.	U.S.	World Ex. U.S.	OECD Ex. U.S.
2017	242	1,616	773	1.6	6.2	3.0
2018	244	1,655	786	1.6	6.6	3.1
2019	248	1,708	804	1.6	7.3	3.3
2020	249	1,691	797	1.7	7.3	3.3
2021	254	1,758	817	1.9	8.0	3.5
2022	262	1,821	849	1.8	8.2	3.7
% Change 2017 - 2022	8%	13%	10%	13%	32%	23%

Source: ASPE analysis of IQVIA MIDAS Data
Notes: All values are in billions of Standard Units. The "World Ex. U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Ex. U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

The data in Appendix Table 3 and 4 can be used to calculate the values in Figure 5.

Appendix Table 3. Sales of Top 50 Drugs Based on Location of Sale, 2017-2022

	Retail, $Billions			Non-Retail, $Billions		
	U.S.	World Ex. U.S.	OECD Ex. U.S.	U.S.	World Ex. U.S.	OECD Ex. U.S.
2017	219	64	53	82	56	49
2018	229	65	56	90	61	54
2019	244	63	54	99	68	59
2020	275	66	56	104	72	61
2021	297	72	61	111	79	67
2022	320	68	58	111	74	62

Source: ASPE analysis of IQVIA MIDAS Data
Notes: All values are in billions. Sales revenues are measured in inflation adjusted U.S. dollars using the US GDP Deflator based on Q1 2023. The "World Ex. U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Ex. U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

Appendix Table 4. Volume of Top 50 Drugs Based on Location of Sale, 2017-2022

	Retail, Volume			Non-Retail, Volume		
	U.S.	World Ex. U.S.	OECD Ex. U.S.	U.S.	World Ex. U.S.	OECD Ex. U.S.
2017	31	103	66	0.6	2.3	0.4
2018	29	95	63	0.5	1.3	0.8
2019	27	96	63	0.5	1.1	0.8
2020	27	97	62	0.6	1.2	0.8
2021	28	99	63	0.6	1.4	0.9
2022	17	46	33	0.7	1.5	1.0

Source: ASPE analysis of IQVIA MIDAS Data
Notes: All values are in billions of Standard Units. The "World Ex. U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Ex. U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

The data in Appendix Tables 5 and 6 can be used to calculate the values in Figure 6.

Appendix Table 5. Sales of Top 50 Drugs Based on Type of Drug, 2017-2022

	Small Molecule Drugs, $Billions			Biologic Products, $Billions		
	U.S.	World Ex. U.S.	OECD Ex. U.S.	U.S.	World Ex. U.S.	OECD Ex. U.S.
2017	187	82	69	162	78	67
2018	194	85	74	180	86	74
2019	204	84	72	197	89	76
2020	226	84	72	212	97	82
2021	236	94	79	232	105	88
2022	242	90	75	253	99	82
% Change 2017 - 2022	29%	9%	8%	56%	27%	22%

Source: ASPE analysis of IQVIA MIDAS Data
Note: All values are in billions. Sales revenues are measured in inflation adjusted U.S. dollars using the US GDP Deflator based on Q1 2023. The "World Ex. U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Ex. U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

Appendix Table 6. Volume of Top 50 Drugs Based on Type of Drug, 2017-2022

	Small Molecule Drug Volumes			Biologic Product Volumes		
	U.S.	World Ex. U.S.	OECD Ex. U.S.	U.S.	World Ex. U.S.	OECD Ex. U.S.
2017	42.5	123	76	1.0	1.8	1.2
2018	41.6	122	76	1.1	1.9	1.2
2019	41.5	118	75	1.0	1.9	1.3
2020	42.0	116	73	1.1	2.0	1.3
2021	42.3	118	73	1.2	2.1	1.4
2022	43.2	127	77	1.3	2.3	1.5
% Change 2017 - 2022	2%	3%	1%	30%	28%	25%

Source: ASPE analysis of IQVIA MIDAS Data
Note: All values are in billions of Standard Units. The "World Ex. U.S." sample is defined as all countries contained in the MIDAS database except for the United States. The "OECD Ex. U.S." sample is defined as all OECD countries contained in the MIDAS database except for the United States.

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