A Painful Pill to Swallow: U.S. vs. International Prescription Drug Prices

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Executive Summary

Americans pay on average nearly four times more for drugs than other countries – in some cases, 67 times more for the same drug.

The United States (U.S.) spent $457 billion in 2016 on combined retail (dispensed at the pharmacy) and non-retail (dispensed in physician offices) drugs.[1] Medicare alone spent nearly $130 billion on prescription drugs that year, $99.5 billion of which was for Part D pharmacy drugs and $29.1 billion of which was for Part B physician-administered drugs.[2] In the five years between 2011 and 2016, drug spending nationwide grew by 27 percent – more than 2.5 times the rate of growth in inflation.[3] According to a 2018 Kaiser Family Foundation poll, 79 percent of Americans believe the costs of prescription drugs are unreasonable – and 26 percent are worried they cannot afford the prescription drugs they need.[4]

Given the rise in prescription drug costs and the associated out-of-pocket burden on consumers, U.S. policymakers and experts are considering models that successfully lower costs. This report examines patterns of drug pricing in the U.S. relative to other international comparator countries through a six-part analysis examining price differentials among 79 drugs sold in 11 countries and the U.S. in 2017 and 2018. The non-U.S. comparators in our analysis were: the United Kingdom (UK), Japan, Ontario, Australia, Portugal, France, the Netherlands, Germany, Denmark, Sweden, and Switzerland.[5]

[1] Observation on Trends in Prescription Drug Spending (2019). *Department of Health and Human Services*. Retrieved from https://aspe.hhs.gov/system/files/pdf/187586/Drugspending.pdf

[2] 10 Essential Facts About Medicare and Prescription Drug Spending (2019). *Henry J. Kaiser Family Foundation.* Retrieved from https://www.kff.org/infographic/10-essential-facts-about-medicare-and-prescription-drug-spending/

[3] Analysis of Centers for Medicare & Medicaid Services, Office of the Actuary prescription drug spending data, Table 11 and BLS data on CPI-U 2011-2016. Retrieved from https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical.html

[4] Public Opinion on Prescription Drugs and Their Prices (2019). *Henry J. Kaiser Family Foundation.* Retrieved from https://www.kff.org/slideshow/public-opinion-on-prescription-drugs-and-their-prices/

[5] Although Ontario is a province and not a country, it is included in the analysis because it purchases its own drugs independently of the rest of Canada. For the purposes of simplicity, we refer to all comparison entities as "countries" or "nations." In all instances throughout this report, this reference to "countries" is inclusive of Ontario.

Key Findings:

U.S. Drug Prices Significantly Higher than All 11 Other Countries

- *The U.S. pays the most for drugs, though prices varied widely.*
- *U.S. drug prices were **nearly four times higher** than average prices compared to similar countries.*
- *U.S. consumers pay significantly more for drugs than other countries, even when accounting for rebates.*
- ***The U.S. could save $49 billion annually** on Medicare Part D alone by using average drug prices for comparator countries.*

The U.S. pays the most for drugs, though prices varied widely. Across the 79 drugs in our sample, the average list price per dose was $152.92, ranging from $0.08[6] to $16,597.[7] Annual pharmaceutical spending per capita varied from $318 in Denmark to $1,220 in the United States. Average annual per capita spending on pharmaceuticals was $675.25 across the 12 countries, $625.73 excluding the U.S. U.S. drug prices are on average outliers relative to all comparator countries. Most countries had average drug prices around 24 to 30 percent of those in the United States. The greatest disparity was with Japan, where the average drug price was only 15 percent that of the U.S., meaning that the U.S. on average spends seven times what Japan pays for the same drugs. Denmark represented the closest average price, where average drug prices were 39.1 percent of the average U.S. drug price.

U.S. drug prices were nearly four times higher than average prices compared to similar countries. We found that individual drug prices in the U.S. ranged from 70[8] to 4,833 percent[9] higher than the combined mean price in the other 11 countries. On average, U.S. drug prices were 3.7 times higher than the combined average of the other 11 countries in the study.

U.S. consumers pay significantly more for drugs than in other nations, even when accounting for rebates. One of the major arguments from the pharmaceutical industry justifying these international price differentials is that while list prices are much higher in the U.S., the rebates offered are also significantly higher, so the net price is comparable. To test this claim, we compared rebate rates in the U.S. to Germany and found German rebate rates are relatively low compared to U.S. rebates, ranging from 0 to 35 percent and averaging 8.7 percent. U.S. rebates would need to average 67 percent to match average German net prices, and the average U.S. rebate rate would need to be about 73.3 percent in order for U.S. net prices to match list prices in

[6] Premarin in the UK
[7] Stelara in the U.S.
[8] Lantus Solostar
[9] Dulera

the other 11 countries in the study. According to the Congressional Budget Office (CBO) the average rebate rate for band name drugs was 22 percent in 2015.[10]

The U.S. could save $49 billion annually on Medicare Part D alone by using average drug prices for other countries. Using our basket of comparison drugs (i.e., an index of average drug prices across all 11 non-U.S. countries), we estimated potential Medicare Part D savings if an average of foreign prices were applied to the U.S. We replicated this comparison using both German prices and U.K. drug prices as a benchmark. The U.S. spent an estimated $67 billion in 2018 on the 79 drugs in our sample through Medicare Part D plans. Purchasing these same drugs using the "basket list price" could reduce Part D spending by $48.8 billion annually.

The analysis presented in this report clearly illustrates that, across the board, the U.S. spends more on drugs than other comparable developed countries. The extent of these pricing differentials varies by drug, manufacturer, and disease group, but the results we present show the existence of large differences between the U.S. drug pricing system and other countries – and the associated negative effect those differences have on out-of-pocket costs borne by the American consumer and associated costs borne by the taxpayer. The system in place now does not work for the Americans who depend on it – by all measures, U.S. consumers pay too high a price for drugs.

[10] Prices for and Spending on Specialty Drugs in Medicare Part D and Medicaid (2019). *Congressional Budget Office*. Retrieved from https://www.cbo.gov/system/files/2019-03/54964-Specialty_Drugs.pdf

Introduction

When the Committee on Ways and Means in 1965 marked up proposals to create what would eventually become Title XVIII of the Social Security Act, it dropped the Medicare Part B prescription drug benefit from the bill due to its potentially high and unpredictable costs.[11] For 41 years, Medicare beneficiaries received most of their prescription drugs from other sources – employer retirement programs, private Medigap coverage, and Medicaid. The Medicare Modernization Act (MMA) of 2003 changed that by creating Medicare Part D, a voluntary outpatient prescription drug benefit administered through private plans.[12]

Since then, Part D has evolved into a plan to protect patients from exorbitant costs, and yet patient burden continues to grow rapidly.[13] Despite its broad uptake – almost 45 million of 59 million Medicare beneficiaries were enrolled in 2019 – the benefit has struggled to provide beneficiaries with protections from high out-of-pocket costs in the face of extremely expensive drugs.[14] Such consumer-facing inadequacies under Part D have resulted in the Medicare Payment Advisory Commission (MedPAC), presidential budgets (under both Obama and Trump), and other independent experts to call for changes to the structure of the Part D program.[15] [16] [17]

Rapid increases in drug prices have over time exacerbated cracks in the Part D program's benefit design.[18] Between 2011 and 2016, drug spending nationwide grew by 27 percent – more than 2.5 times the rate of growth in inflation.[19] In particular, the rise in spending for specialty drugs has driven the increase in spending in Medicare Part D and Medicaid.[20] A 2019 Congressional Budget Office (CBO) report found that from 2010 to 2015, specialty drugs

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[11] Oliver, Thomas R. et. al. (2004). A Political History of Medicare and Prescription Drug Coverage. *The Milbank Quarterly*. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2690175/#targetText=On%20December%208%2C%202003%2C%20President,other%20changes%20to%20the%20program.

[12] *Id.*

[13] Blum, Jonathan (2006). A History of Creating the Medicare Prescription Drug Benefit. *Avalere Health LLC*. Retrieved from https://avalere.com/research/docs/Part_D_Commentary.pdf

[14] Cubanski, Juliette and Neuman, Tricia (2019). 10 Things to Know About Medicare Part D Coverage and Costs in 2019. Retrieved from https://www.kff.org/medicare/issue-brief/10-things-to-know-about-medicare-part-d-coverage-and-costs-in-2019/

[15] Improving Medicare Part D. *Medicare Payment Advisory Commission, June 2016.* Retrieved from http://www.medpac.gov/docs/default-source/reports/chapter-6-improving-medicare-part-d-june-2016-report-.pdf

[16] US Department of Health and Human Services. (2017). Budget in Brief: Strengthening Health and Opportunity for All Americans. Budget in Brief: Strengthening Health and Opportunity for All Americans. Retrieved from https://www.hhs.gov/sites/default/files/fy2017-budget-in-brief.pdf

[17] US Department of Health and Human Services. (2019). Budget in Brief: Putting America's Health First . Budget in Brief: Putting America's Health First. Retrieved from https://www.hhs.gov/sites/default/files/fy-2019-budget-in-brief.pdf

[18] *Id.*

[19] Analysis of Centers for Medicare & Medicaid Services, Office of the Actuary prescription drug spending data, Table 11 and BLS data on CPI-U 2011-2016. Retrieved from https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical.html

[20] Cubanski, Juliette and Neuman, Tricia (2019). How Much Does Medicare Spend on Insulin. *Henry J Kaiser Family Foundation*. Retrieved from https://www.kff.org/medicare/issue-brief/how-much-does-medicare-spend-on-insulin/

accounted for 13 percent of Part D spending in 2010 and 31 percent by 2015; in Medicaid, those rates were 25 percent in 2010 and 35 percent by 2015.[21] With six in 10 Americans reporting they currently take at least one prescription medication (and one in four reporting they take four or more), drug prices have far-reaching effects.[22]

Countervailing trends – skyrocketing drug prices coupled with an increasingly aging population in need of prescription drugs – have increased urgency among congressional lawmakers and Trump Administration officials to develop policies aimed at reigning in the cost of drugs for American consumers.[23] These approaches to protect and preserve Part D include such payment options as allowing the Secretary of the Department of Health and Human Services (the Secretary) to negotiate the price of drugs on behalf of the Medicare program.[24]

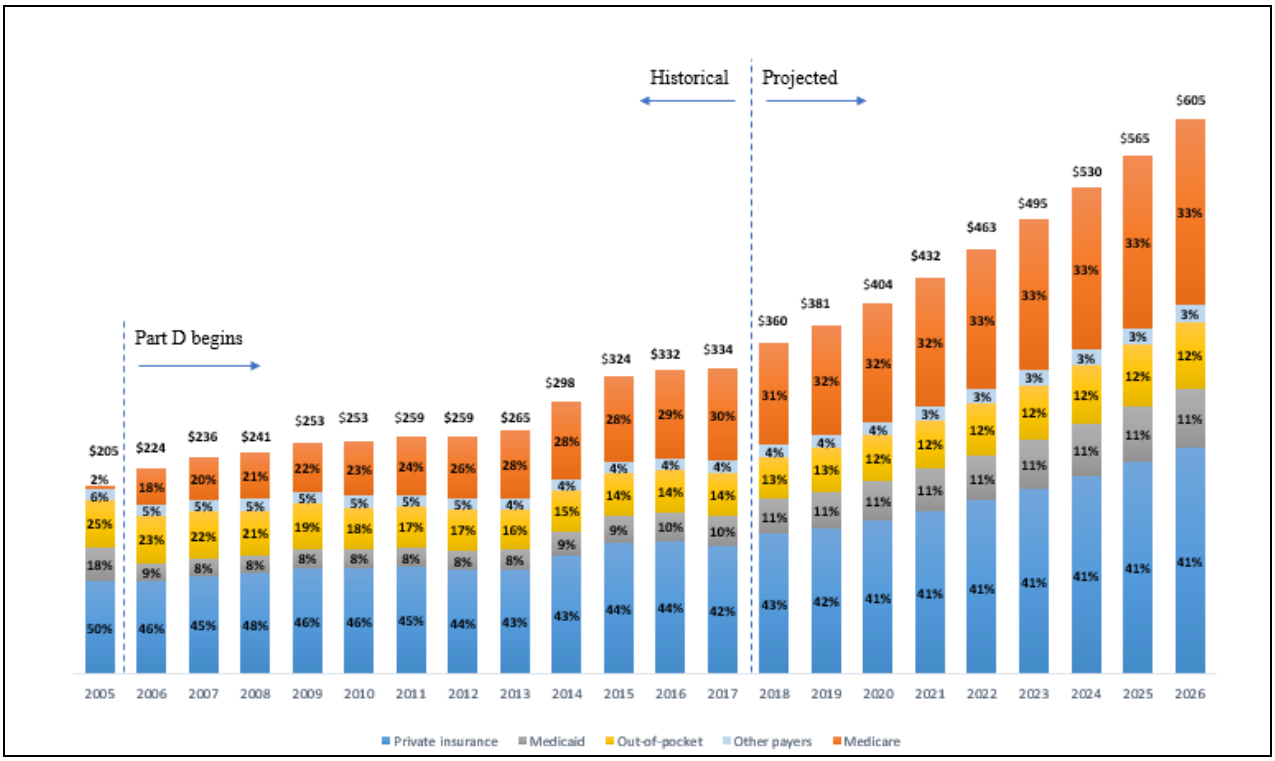
In particular, the huge drug price differentials between the United States (U.S.) and other developed countries has focused lawmakers' attention on ensuring U.S. consumers get a better deal. According to one study, the U.S. spent between three and four times the rate for certain single-source brand name drugs than the United Kingdom (U.K.), Japan, or Ontario.[25] Despite the wide acknowledgement of these international disparities in price and spending, researchers have not explored in great detail the differences in prices for drugs across an array of comparable developed countries. This report examines patterns of drug pricing in the U.S. relative to other international comparator countries, using a subset of 79 common drugs and a descriptive empirical approach to document differences in pricing in the U.S. relative to other countries. Findings from this report will provide context for policy proposals to bring down drug prices in the U.S.

[21] Prices for and Spending on Specialty Drugs in Medicare Part D and Medicaid (2019). *Congressional Budget Office*. Retrieved from https://www.cbo.gov/system/files/2019-03/54964-Specialty_Drugs.pdf
[22] Public Opinion on Prescription Drugs and Their Prices (2019). *Henry J. Kaiser Family Foundation.* Retrieved from https://www.kff.org/slideshow/public-opinion-on-prescription-drugs-and-their-prices/
[23] Sachs, Rachel (2019). Prescription Drug Policy: The Year in Review, and the Year Ahead. Health Affairs Blog. Retrieved from https://www.healthaffairs.org/do/10.1377/hblog20190103.183538/full/
[24] Cubanski, Juliette et. al. (2019). What's the Latest on Medicare Drug Price Negotiations? Retrieved from https://www.kff.org/medicare/issue-brief/whats-the-latest-on-medicare-drug-price-negotiations/
[25] Kang, So-Yeon et. al. (2019). Using External Reference Pricing in Medicare Part D to Reduce Drug price Differentials with Other Countries. *Health Affairs Blog*. Retrieved from https://www.healthaffairs.org/doi/pdf/10.1377/hlthaff.2018.05207

Background

The U.S. spent $457 billion in 2016 on combined retail (dispensed at the pharmacy) and non-retail (dispensed in physician offices) drugs.[26] [27] Medicare alone spent nearly $130 billion on prescription drugs that year, $99.5 billion of which was for Part D pharmacy drugs and $29.1 billion of which was for Part B physician-administered drugs.[28] In total, 30 percent of Medicare spending went to prescription drug costs in 2016.[29] As Figure 1 shows, U.S. spending on prescription drugs has been rising precipitously during the time that Medicare has been paying for drugs under Part D. Projections indicate this spending will only continue to increase.

Figure 1. Historical and Projected Prescription Drug Spending by Payer, 2005-2026 [30]



SOURCES and NOTES: *Figure 1 was reproduced from the Henry J Kaiser Family Foundation article entitled "10 Essential Facts About Medicare and Prescription Drug Spending." Data were provided by the Henry J. Kaiser Family Foundation. The figure only includes Medicare Part D data.*

There is a direct and positive relationship between the cost of drugs and drug spending. Between 2012 and 2016, drug spending grew by 27 percent for individuals with employer-

[26] Observation on Trends in Prescription Drug Spending (2019). *Department of Health and Human Services*. Retrieved from https://aspe.hhs.gov/system/files/pdf/187586/Drugspending.pdf
[27] Retail Prescription Drugs Filled at Pharmacies per Capita (2018). *Henry J. Kaiser Family Foundation.* Retrieved from https://www.kff.org/health-costs/state-indicator/retail-rx-drugs-per-capita/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D
[28] 10 Essential Facts About Medicare and Prescription Drug Spending (2019). *Henry J. Kaiser Family Foundation.* Retrieved from https://www.kff.org/infographic/10-essential-facts-about-medicare-and-prescription-drug-spending/
[29] *Id.*
[30] *Id.*

sponsored health insurance; at the same time, drug prices increased by almost 25 percent (and utilization only increased by about two percent during that time).[31]

The introduction of new types of drugs into the market is one driving factor of these increases in spending. For example, in 2014 and 2015, prescription drug spending increased rapidly because of the new high-cost hepatitis C drugs that came to market.[32] Drugs are most expensive when they are first introduced to market, before there is competition of other drugs in their class, and before the original patent expires and generics become available.[33]

America's Drug Prices are Too High

American consumers are feeling the effects of drug pricing increases directly, with many facing the life-threatening choice between filling a necessary prescription and putting food on the table.[34] Six in 10 Americans report they currently take at least one prescription medication, and one in four report taking four or more medications.[35] According to a 2018 Kaiser Family Foundation poll, 79 percent of Americans believe the costs of prescription drugs are unreasonable, and 26 percent are worried they may not be able to afford the prescription drugs they need.[36]

Such concerns are merited: According to one 2015 poll, an estimated one in four Americans had not filled a prescription in the last year because of the high cost of the drug.[37] Similarly, a 2013 study found that one in four cancer patients had either not filled a prescription or had reduced their prescribed dosage as a result of the price tag associated with the drugs.[38]

As the cost of prescription drugs continues to climb, this reality will only affect more Americans. In 2015, the average total cost of treating a patient with specialty medications was more than $52,000, with patients responsible for a bill in excess of $10,000, on average.[39]

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[31] 2016 Health Care Cost and Utilization Report (2018). *Health Care Cost Institute*. Retrieved from https://www.healthcostinstitute.org/research/annual-reports/entry/2016-health-care-cost-and-utilization-report

[32] Henry, B. (2018). Drug Pricing and Challenges to Hepatitis C Treatment Access. *Journal of Health & Biomedical Law, 14,* 265-283.

[33] *Id.*

[34] The Affordability Conundrum (2017). *National Academies of Sciences, Engineering, and Medicine*. Retrieved from: https://www.ncbi.nlm.nih.gov/books/NBK493099/

[35] Public Opinion on Prescription Drugs and Their Prices (2019). *Henry J. Kaiser Family Foundation.* Retrieved from https://www.kff.org/slideshow/public-opinion-on-prescription-drugs-and-their-prices/

[36] *Id.*

[37] Poll: Nearly 1 in 4 Americans Taking Prescription Drugs Say It's Difficult to Afford Their Medicines (2019). *Henry J. Kaiser Family Foundation.* Retrieved from https://www.kff.org/health-costs/press-release/poll-nearly-1-in-4-americans-taking-prescription-drugs-say-its-difficult-to-afford-medicines-including-larger-shares-with-low-incomes/

[38] Zafar et al. (2013). The financial toxicity of cancer treatment: A pilot study assessing out-of-pocket expenses and the insured cancer patient's experience. *Oncologist.* 2013;18(4):381-90. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/23442307

[39] Trends in Retail Prices of Specialty Prescription Drugs Widely Used by Older Americans, 2006 to 2015 (2017). *AARP Public Policy Institute*. Retrieved from https://www.aarp.org/content/dam/aarp/ppi/2017/11/full-report-trends-in-retail-prices-of-specialty-prescription-drugs-widely-used-by-older-americans.pdf

Among Medicare beneficiaries, 21 percent of out-of-pocket spending in 2016 went to prescription drugs.[40]

External Reference Pricing and Pharmaceutical Cost Containment Abroad

Given the rise in prescription drug costs and the associated out-of-pocket spending burden on consumers, U.S. policymakers and experts have been focusing their attention on ways to bring down costs for constituents, in part by looking to models abroad. Based on the average cost of drugs, models in other developed nations are arguably more effective than the U.S. in protecting consumers from rising drug prices by using an external reference pricing (ERP) system.

An ERP system refers to the practice of using the price of a pharmaceutical product (generally an ex-factory price, also referred to as a "list price") in one or several countries to create a benchmark or reference price for the purposes of setting or negotiating drug prices in a given country. [41] [42] With the exceptions of Denmark, Sweden, and the U.K., almost every European country – and most other developed nations – has established some form of an ERP.[43]

Most countries with an ERP create a "basket" of rates in comparable countries and use the average of all prices in the basket as a benchmark, but there is some variation (e.g., Spain uses the lowest price of comparator systems; Greece uses the average of the three lowest prices). The number of countries used as references ranges from three in Portugal to 30 in Poland. Most countries use manufacturer prices (i.e., the price that the manufacturer charges wholesalers or pharmacies) for their ERP; however, Finland uses wholesale prices (i.e., list prices for a drug to wholesalers or other direct purchasers, which does not include discounts or rebates) and the Netherlands uses retail prices (i.e., manufacturers' sales prices for a drug, net of price adjustments).[44] Every country with an ERP uses publicly available price information, which does not incorporate confidential discounts and rebates negotiated between payers and manufacturers.

Many countries also incorporate an internal reference price (IRP), which is typically used for pricing generics.[45] IRPs are meant to determine pharmaceutical prices based on market equivalents or similar products within the country.[46] They are also used to set payment rates for

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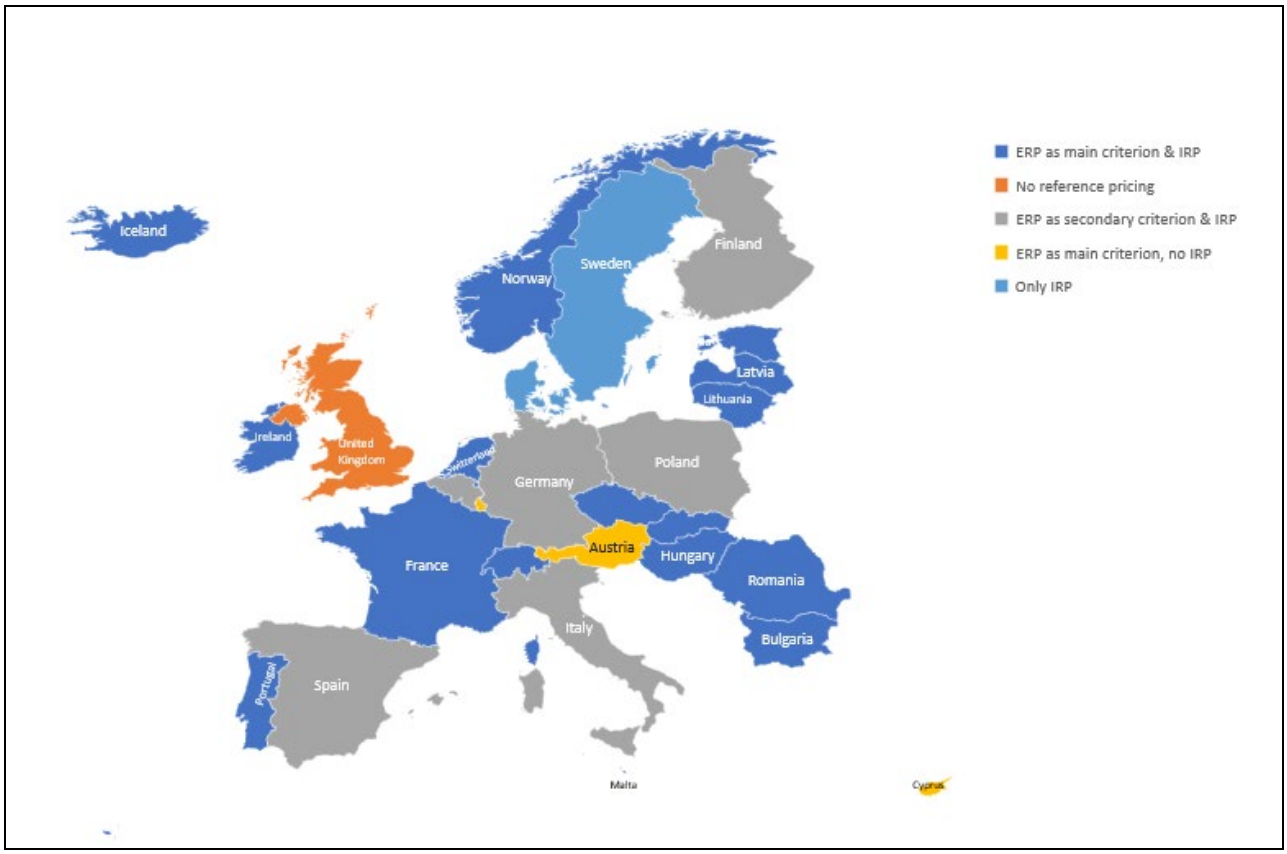
[40] 10 Essential Facts About Medicare and Prescription Drug Spending (2019). *Henry J. Kaiser Family Foundation.* Retrieved from https://www.kff.org/infographic/10-essential-facts-about-medicare-and-prescription-drug-spending/
[41] Dimitra Panteli et al. (2016). Pharmaceutical Regulation in 15 European Countries. *Health Systems in Transition*. Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0019/322444/HiT-pharmaceutical-regulation-15-European-countries.pdf?ua=1
[42] WHO Guideline on Country Pharmaceutical Pricing Policies (2013). *World Health Organization*. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK258618/
[43] *Id.*
[44] Mattingly, Joey (2012). Understanding Drug Pricing. *U.S. Pharmacist*. Retrieved from https://www.uspharmacist.com/article/understanding-drug-pricing
[45] Dimitra Panteli et al. (2016). Pharmaceutical Regulation in 15 European Countries. *Health Systems in Transition*. Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0019/322444/HiT-pharmaceutical-regulation-15-European-countries.pdf?ua=1
[46] Dimitra Panteli et al. (2016). Pharmaceutical Regulation in 15 European Countries. *Health Systems in Transition*. Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0019/322444/HiT-pharmaceutical-regulation-15-European-countries.pdf?ua=1

product groups, which typically cluster drugs according to active substance or therapeutic class.[47] Figure 2 provides a summary of the variation in reference pricing approaches across European countries; only three countries (Sweden, Denmark, and the U.K.) with data depicted on the map do not use some form of ERP.

Figure 2. Use of Reference Pricing in European Countries, 2016[48]



SOURCES and NOTES: *Figure 2 was reproduced from the from the Dimitra Panteli et al. (2016) Health Systems in Transition article entitled, "Pharmaceutical Regulation in 15 European Countries."*

Regardless of the approach, empirical evidence shows ERPs are effective in ensuring drug prices are more moderately priced in a market, resulting in reductions in prices of about 15 percent over 10 years, according to one study.[49] In the domestic context, a Center for Economic and Policy Research study suggested Medicare could save $541 billion over 10 years – approximately $54 billion annually – if Medicare's system looked more like Denmark's; beneficiaries would save $112.4 billion within this same policy framework. [50] The study also

[47] *Id.*
[48] *Id.*
[49] *Id.*
[50] Shih, C., Schwartz, J., and Coukell (2016). A. How Would Government Negotiation of Medicare Part D Drug Prices Work? *Health Affairs Blog.* Retrieved from https://www.healthaffairs.org/do/10.1377/hblog20160201.052912/full/

found that on average, Americans spend nearly twice as much per person per year on prescription drugs, when compared to countries like Canada, Denmark, Germany and the UK.[51]

EFPIA Principles for External Reference Pricing Systems

The European Federation of Pharmaceutical Industries and Associations (EFPIA) is the advocacy group that represents the pharmaceutical industry operating in Europe.[52] In 2014, the EFPIA provided recommendations for configuring an ERP system and integrating it into a wider pricing mechanism.[53] The EFPIA issued such recommendations to address difficulties in cross-market comparisons, consumer costs, consumer access, and research and development (R&D) spending.[54]

EFPIA-issued recommendations on ERP system standards

- *An ERP should be used in the context of a broader pricing and reimbursement methodology that provides flexibility in price negotiations.*
- *An ERP should cluster approximately five to seven countries with comparable Gross Domestic Product (GDP) per capita and similar health care systems.*
- *Ex-factory prices should be referenced since distribution structures and tax rates vary widely across countries. Incorporating negotiated prices or discounts could undermine the flexibility of customers to agree to the terms of the manufacturer.*
- *The methodology of an ERP should use an average price and not the lowest price of the basket. Responsible ERP methods should calculate a weighted average of a "basket" of ex-factory prices.*
- *ERP is best used for the launch of a product.*
- *Restricting country baskets to the same currency zone avoids distortions to currency fluctuations.*
- *Data sources should be valid, reliable, public, and vetted by stakeholders with direct interest in the pricing process.*

No country has configured its ERP to match all of these guiding principles. Most countries with an ERP use the average price of a basket and do not weight them by market size or purchasing power parity.[55] With the exception of the basket size recommendation, Germany's ERP configuration strategy comes closest to the EFPIA recommendations.[56]

[51] Principles for Application of International Reference Pricing Systems (2014). *European Federation of Pharmaceutical Industries and Associations*. Retrieved from http://www.pharmalogica.pl/efpia-position-paper-principles-for-application-of-international-reference-pricing-systems,i2301?download=2362
[52] About Us (2019). *European Federation of Pharmaceutical Industries and Associations*. Retrieved from https://www.efpia.eu/about-us/
[53] *Id.*
[54] *Id.*
[55] Dimitra Panteli et. al. (2016). Pharmaceutical Regulation in 15 European Countries. *Health Systems in Transition*. Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0019/322444/HiT-pharmaceutical-regulation-15-European-countries.pdf?ua=1
[56] *Id.*

Trump Administration Part B International Price Index (IPI) Proposal[57]

In 2018, the Centers for Medicare & Medicaid Services (CMS) released an Advance Notice of Proposed Rulemaking (ANPRM) that for the first time sought to leverage international models to reduce drug prices in the U.S.[58] Specifically, the ANPRM sought public input on ways to change how Medicare pays for Part B prescription drugs that patients receive in doctors' offices, like chemotherapy or eye injections (the model did not include drugs patients pay for at the pharmacy under Medicare Part D).[59] While not fully developed, the Trump Administration took a first step at initiating an ERP system, though its design did not echo most ERP recommendations. Still, the IPI was an acknowledgement that the U.S. is paying more for drugs than other countries, a reality that has harmed American consumers.

The model lacked clarity on many structural details; however, it proposed supplying Part B drugs to providers through a middleman vendor based on an average sales prices (ASP) and International Price Index (IPI) blended rate. Currently, CMS pays doctors and hospitals the ASP plus six percent of the drug price for administrative costs.[60] The ASP is a calculation of the weighted average of manufacturers' sales prices for a drug for all purchasers, net of price adjustments.[61] As described, the model changes how Medicare pays hospitals and providers (but not pharmaceutical companies) for drugs. Since nothing requires drug companies to sell the prescriptions to the middleman at a lower price than they receive today, there is concern these proposals could simply shift costs around.[62]

The Trump Administration's initial projections estimate that the plan would save $17.2 billion over five years and reduce out-of-pocket costs for Medicare beneficiaries by $3.4 billion.[63] However, key details are missing in this proposal on how it would be operationalized. Additionally, most drug costs are incurred in Part D and this proposal is limited to Part B – a small part of the drug market – reducing IPI's ability to affect the drug pricing system on a larger scale for Medicare beneficiaries or Americans more broadly. CMS has not released the policy as a Proposed Rule.[64]

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[57] ANPRM International Pricing Index Model for Medicare Part B Drugs (2018). *Centers for Medicare and Medicaid Services*. Retrieved from https://www.cms.gov/newsroom/fact-sheets/anprm-international-pricing-index-model-medicare-part-b-drugs

[58] *Id.*

[59] *Id.*

[60] Mattingly, Joey (2012). Understanding Drug Pricing. *U.S. Pharmacist*. Retrieved from https://www.uspharmacist.com/article/understanding-drug-pricing

[61] *Id.*

[62] Liberman, Steven and Ginsburg, Paul B. (2019). CMS's International Pricing Model for Medicare Part B Drugs: Implementation Issues. *Health Affairs Blog*. Retrieved from https://www.healthaffairs.org/do/10.1377/hblog20190708.294165/full/

[63] *Id.*

[64] *Id.*

Results

Given the focus on international drug pricing models as an example for bringing down costs in the U.S., we conducted an analysis to understand the extent to which U.S. drug prices exceed those in other similar countries globally. As policymakers continue to consider ways to drive down drug prices in the U.S. – particularly through external reference-type models – it is increasingly important to better understand the relationship between the prices and costs in the U.S. system and comparable countries abroad. Accordingly, the following section describes the results from our six-part analysis conducted to examine price differentials among a select subset of 79 drugs sold in 11 countries and the U.S. in 2017 and 2018; a detailed description of the methodology employed and limitations of this analysis is included in Appendix A to this report.[65]

1. Descriptive Statistics

Table 1 presents descriptive statistics for average drug prices, by country, for each of the 12 countries in our study cohort. Across the 79 drugs in our sample, the average list price was $152.92, ranging from $0.08 (Premarin, a medication used to treat symptoms of menopause, in the U.K.) to $16,597 (Stelara, a medication used to treat moderate to severe plaque psoriasis, in the U.S.).[66] [67] Pharmaceutical spending per capita varied from $318 in Denmark to $1,220 in the United States. Average per capita spending on pharmaceuticals was $675.25 across the 12 countries. Across the 12 countries sampled, there were an average of 61.4 drug prices listed (out of a possible 79 drugs). Due to data aberrations, the number of drug prices listed on each country's database varied from 37 drugs in Portugal to all 79 drugs in the U.S.

[65] Although Ontario is a province and not a country, it is included in the analysis because it purchases its own drugs independently of the rest of Canada. For the purposes of simplicity, we refer to all comparison entities as "countries" or "nations." In all instances throughout this report, this reference to "countries" is inclusive of Ontario.
[66] Premarin (2019). *Pfizer Inc*. Retrieved from https://www.premarin.com/
[67] Stelara (2019). *Janssen Biotech, Inc*. Retrieved from https://www.stelarahcp.com/

Table 1. Descriptive Statistics on Prescription Drug Prices for Select Countries, 2018

Summary Statistics of Pharmaceutical List Prices, 2018					
	Average	**Min**	**Max**	**Pharmaceutical Spending per Capita[68]**	**Drugs Listed**
U.S.	$466.15	$5.36	$16,597.86	$1,220.00	79
UK	$105.45	$0.08	$2,921.09	$469.00	78
Japan	$69.50	$0.15	$488.66	$838.00	58
Canada (Ontario)	$132.59	$0.27	$3,557.82	$832.00	47
Australia	$113.57	$0.67	$3,043.87	$673.00	62
Portugal	$82.97	$0.32	$682.02	$403.00	37
France	$104.51	$0.42	$2,455.79	$653.00	54
Netherlands	$152.86	$1.42	$3,742.87	$396.00	61
Germany	$165.01	$0.46	$4,728.76	$823.00	65
Denmark	$182.29	$0.90	$4,719.68	$318.00	65
Sweden	$143.91	$0.54	$3,612.73	$515.00	59
Switzerland	$116.22	$0.69	$3,475.85	$963.00	72
Average	$152.92	$0.08	$16,597.86	$675.25	79
Average (excluding US)	$124.45	$0.08	$4,728.76	$625.73	59.9

SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Pharmaceutical spending per capita refers to the entire country of Canada and not specifically Ontario, Canada.*

Most countries had average drug prices around 24 to 30 percent of those in the United States. The greatest disparity was with Japan, where the average drug price was only 15 percent that of the U.S., meaning that the U.S. on average spends seven times what Japan pays for the same drugs.

As Table 1 shows, U.S. drug prices are, on average, outliers relative to all comparator countries. When excluding the U.S., the average drug price of the other 11 countries ($124.45) is only about 27 percent of the average drug price in the US ($466.15). When excluding both the U.S. and Portugal (the country with the lowest GDP) from this cohort, the average drug price was $129.56 for the other 10 countries. Most countries had average drug prices around 24 to 30 percent of those in the United States. The greatest disparity was with Japan, where the average drug price was only 15 percent that of the U.S., meaning that the U.S. on average spends seven times what Japan pays for the same drugs. Denmark represented the smallest disparity, where average drug prices were 40 percent of the average U.S. drug price.

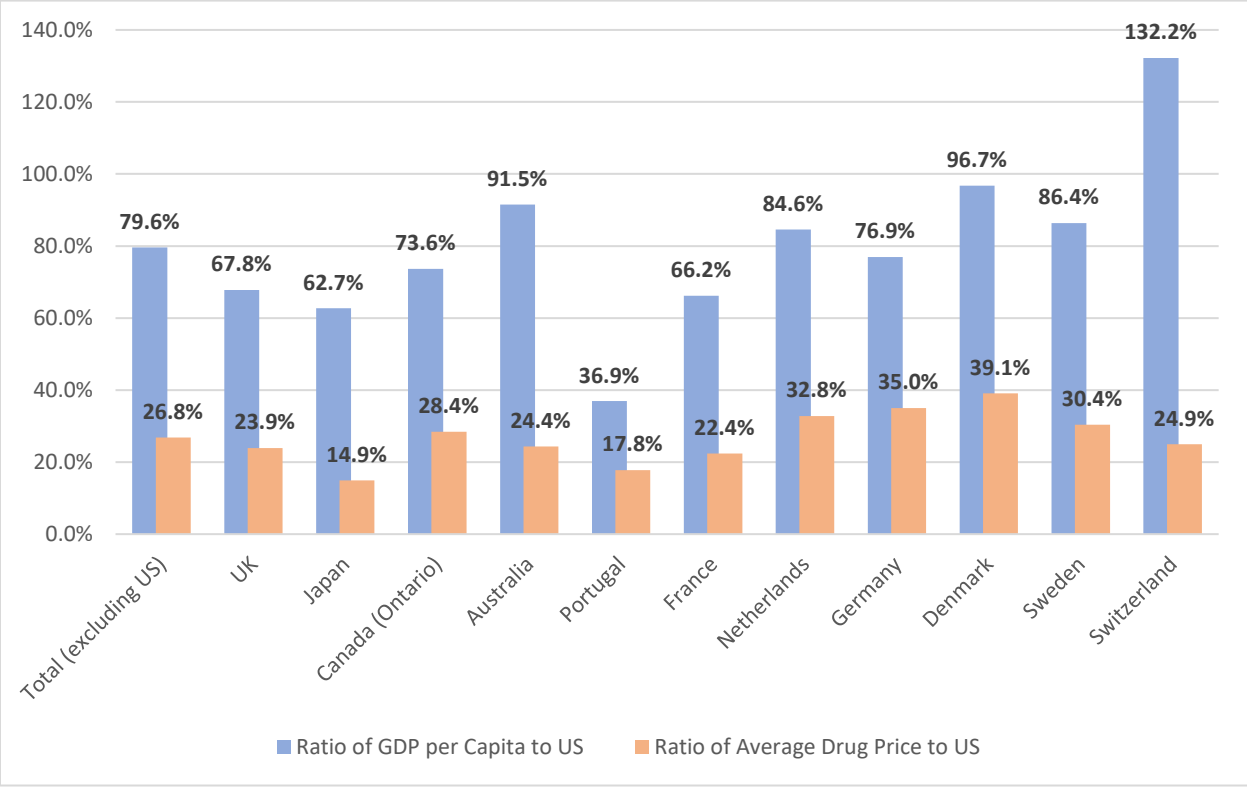
[68] Pharmaceutical Spending (2018). *Organisation for Economic co-operation and Development.* Retrieved from https://data.oecd.org/healthres/pharmaceutical-spending.htm

The highest per-dose drug price in the sample was for Stelara, priced at a $16,597.86.[69] Stelara was between 3.5 to 6.75 times more expensive in the U.S. than in other countries in our dataset. Of the 79 drugs listed, the lowest-priced drug in the U.S. was Premarin.[70] Still, in the U.S., this drug costs $5.36, which is 20 to 67 times the average price of Premarin in the other 11 countries.

2. Factors Affecting Price Differentials

Figure 3 shows results from our analysis on the extent to which per capita GDP might drive drug prices in a given country. If per capita GDP is positively associated with drug prices in a given country, we would expect the 11 non-U.S. countries in our analysis to have drug prices at about 80 percent of those in the U.S. Figure 3 shows this was not the case: For the drugs included in this analysis, the combined average drug prices were 26.8 percent (or 34.3 percent without Portugal) of average U.S. drug prices.

Figure 3. Percent of International GDP per Capita to US GDP per Capita and Average Prescription Drug Price Compared to U.S. Average Drug Price under Medicare Part D, 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources.*

[69] Stelara (2019). *Janssen Biotech, Inc*. Retrieved from https://www.stelarahcp.com/
[70] Premarin (2019). *Pfizer Inc*. Retrieved from https://www.premarin.com/

While most countries had a lower GDP per capita than the U.S., Switzerland had a GDP per capita over 30 percentage points greater than that of the United States. Despite its greater per capita wealth and, thus, purchasing power, Switzerland had average drug prices about 25 percent of those in the U.S. As shown in Figure 3, although relative GDP per capita per country ranged from 37 percent to 132.2 percent that of the U.S., average drug prices were more consistent, at about 15 percent to 40 percent of the U.S.'s average drug price.

If per capita GDP is positively associated with drug prices in a given country, we would expect the 11 non-U.S. countries in our analysis to have drug prices at about 80 percent of those in the U.S. This was not the case: For the drugs included in this analysis, the combined average drug prices were 26.8 percent (or 34.3 percent without Portugal) of average U.S. drug prices.

Notably, Portugal had a lower GDP per capita ($21,136.30) compared to the average GDP per capita ($50,931.58) across the entire sample of countries. We included it in our study because Portugal utilizes a unique ERP model, which bases its ERP calculation on the lowest price of its three-country basket.[71] Where relevant, we have included calculations that exclude Portugal from the sample.

3. International Comparison of Average Prescription Drug Prices

One of the primary goals of this study was to determine the price differential between drug prices in the U.S. and other comparable nations. If prices in the U.S. are just marginally higher than most countries, then these price differentials may be explained by justifiable variations in per capita income or other manufacturing costs. If the price differentials between the U.S. and other nations are large, then factors other than per capita GDP are likely driving the higher prices in the U.S. market.

With one exception, individual drug prices in the U.S. ranged from 70 percent to 4833 percent higher than the combined mean price in the 11 other countries studied… On average, U.S. drug prices were 3.7 times higher than the combined average of the other 11 countries.

With one exception, we found that individual drug prices in the U.S. ranged from 70 percent (Lantus Solostar – a type of insulin) to 4,833 percent (Dulera – a prescription asthma medication) higher than the combined mean price in the other 11 countries.[72] [73] Compared to individual countries, drug prices in the U.S. ranged from 0.6 to 67 times the price for the same drugs. On average, U.S. drug prices were 3.7 times higher than the combined average of the other 11 countries. There was only one drug, Reyataz, an HIV medication, where the price in the U.S. ($7.93) was lower than the combined mean price of the other 11 countries ($8.25) – by about 3.9 percent.[74]

[71] Dimitra Panteli et. al. (2016). Pharmaceutical Regulation in 15 European Countries. *Health Systems in Transition*. Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0019/322444/HiT-pharmaceutical-regulation-15-European-countries.pdf?ua=1

[72] Using Lantus (2019). *Sanofi-Aventis US LLC*. Retrieved from https://www.lantus.com/using-solostar-insulin-pen

[73] Dulera (2018). *Merck Sharp & Dohme Corp*. Retrieved from https://www.dulera.com/

[74] What is Reyataz? (2018). *Bristol-Myers Squibb Company*. Retrieved from http://www.reyataz.com/what-is-reyataz

Lower-priced drugs exhibited larger disparities between the U.S. and its international comparators. The largest disparity occurred with Dulera, which costs $23.95 per dose in the U.S. but averages $0.49 in the other countries, making it nearly 5,000 percent more expensive in the U.S. Similarly, Premarin (3,116 percent higher price in the U.S.), Advair Diskus[75], an asthma medication (1,296 percent higher price in the U.S.), Januvia[76], a non-insulin Type 2 diabetes medication (1,019 percent higher price in the U.S.), and Combigan[77], a medication to treat symptoms of glaucoma (985 percent higher price in the U.S.), were all about 10 times more expensive in the U.S. compared to the mean price in the other 11 countries.

For high-priced drugs, the relative price differential in the U.S. was lower, but prices were still higher in the U.S. than in other countries. Humira, an anti-inflammatory drug used to treat a number of conditions, is the best-selling prescription drug in the world.[78] Since 2012, it has doubled in price in the U.S. and is currently priced at $2,346.02 per dose (it reputedly costs an average of $38,000 per patient per year after rebates).[79] Compared to the combined mean price of the other 11 countries ($450.60), Humira is over 500 percent more expensive in the U.S. In fact, by country, the next highest price for Humira is in Denmark, where it costs $787.10 per dose, about a third of the price in the U.S. Figure 3 summarizes these data, showing average drug prices by country as a percentage of U.S. prices.

Comparative Analysis of Manufacturers

Our analytic file of 79 drugs included 31 manufactures, only 12 of which manufactured a single drug represented in the database. Of these 12 companies, the ratio of U.S. list prices compared to average international list prices varied substantially, though prices were consistently higher in the U.S. For instance, Pharmacyclics priced its cancer medication Imbruvica 88 percent higher in the U.S. than the average international list price.[80] Glaxosmithkline priced Advair Diskus, nearly 1,300 percent higher in the U.S. than the average international price.

Of the 19 companies that manufacture multiple drugs in our sample, most manufacturers priced their drugs in the U.S. at about 200 to 400 percent of the list prices in other countries. This range was close to the average ratio of U.S. list prices to average international list prices; several drugs were significantly higher, however. Gilead Sciences priced Sovaldi, Harvoni, Stribild, Genvoya, and Letairis between 200 percent and 350 percent the average international price, but they priced Ranexa at almost 650 percent the average international price.[81] A number of manufacturers had multiple drugs with extremely large disparities between U.S. and international prices. To illustrate this point, Figure 4 depicts a breakdown of five select manufacturers and the drugs with the largest discrepancies between U.S. and international prices.

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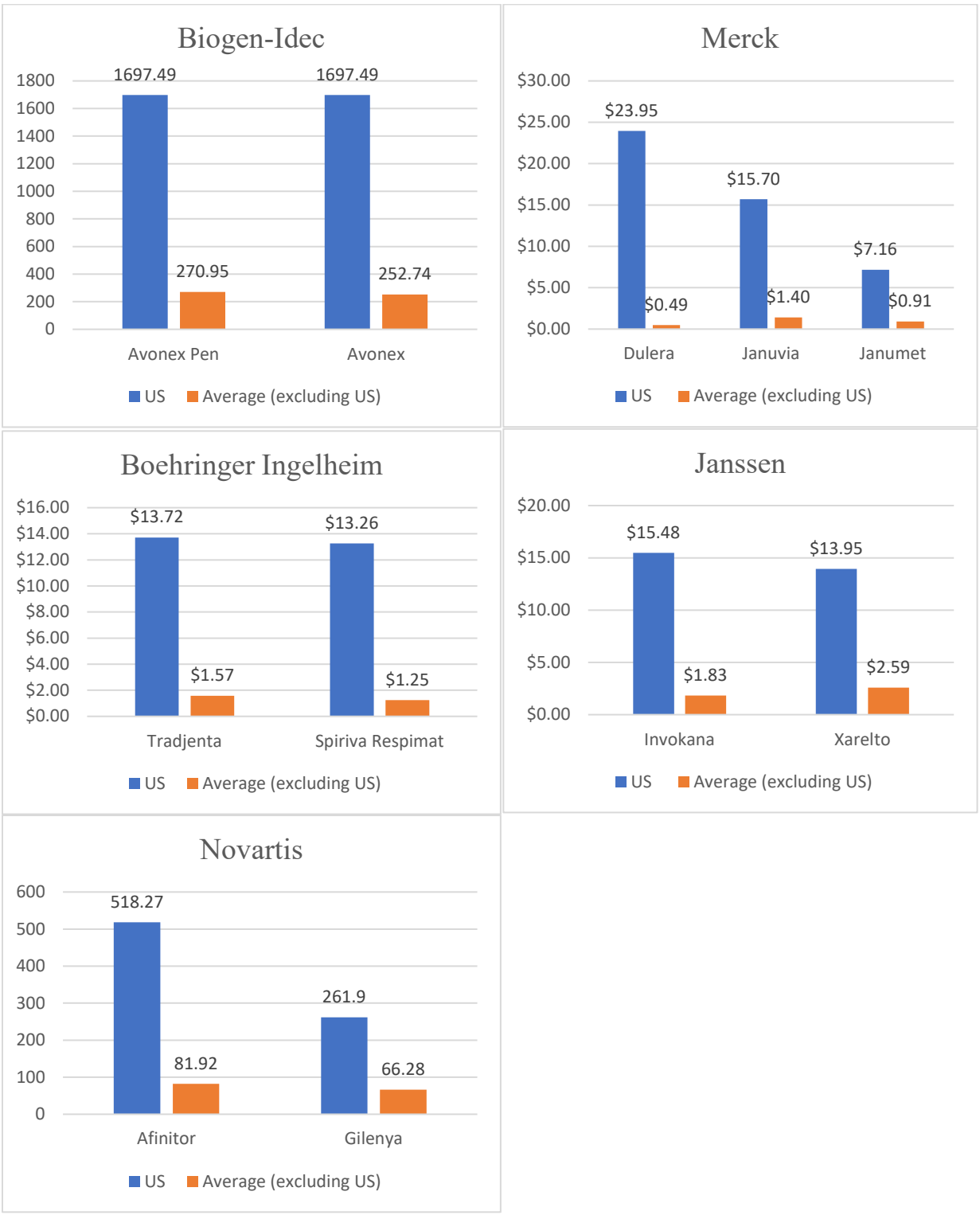
[75] Advair Diskus (2018). *GSK or licensor*. Retrieved from https://www.advair.com/
[76] About Januvia (2019). *Merck Sharp & Dohme Corp*. Retrieved from https://www.januvia.com
[77] Combigan (2018). *Allergan*. Retrieved from https://www.combigan.com/patient/Default.aspx
[78] Hakim, Danny (2018). Humira's Best-Selling Drug Formula: Start at a High Price. *The New York Times*. Retrieved from https://www.nytimes.com/2018/01/06/business/humira-drug-prices.html
[79] *Id.*
[80] How does Imbruvica work? (2019). *Pharmcyclics LLC.* Retrieved from https://www.imbruvica.com/cll/how-does-imbruvica-work
[81] Medicines (2019). *Gilead Sciences, Inc.* Retrieved from https://www.gilead.com/science-and-medicine/medicines

Figure 4. Prescription Drug Prices for Select Drugs by Manufacturer, 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources.*

In the Merck & Co. example, Dulera was priced at almost 50 times the average international price ($23.49 compared to $0.49). Januvia[82] and Janumet[83], both used to treat Type 2 diabetes, are priced in the U.S. at 1,120 percent and 790 percent the average international price, respectively.

Comparative Analysis of Disease Groups and International Drug Prices

When analyzing by disease groups, arthritis medications, multiple sclerosis medications, and non-insulin diabetes medication exhibited the largest U.S.-international drug price differentials in our dataset.

Diabetes Medication

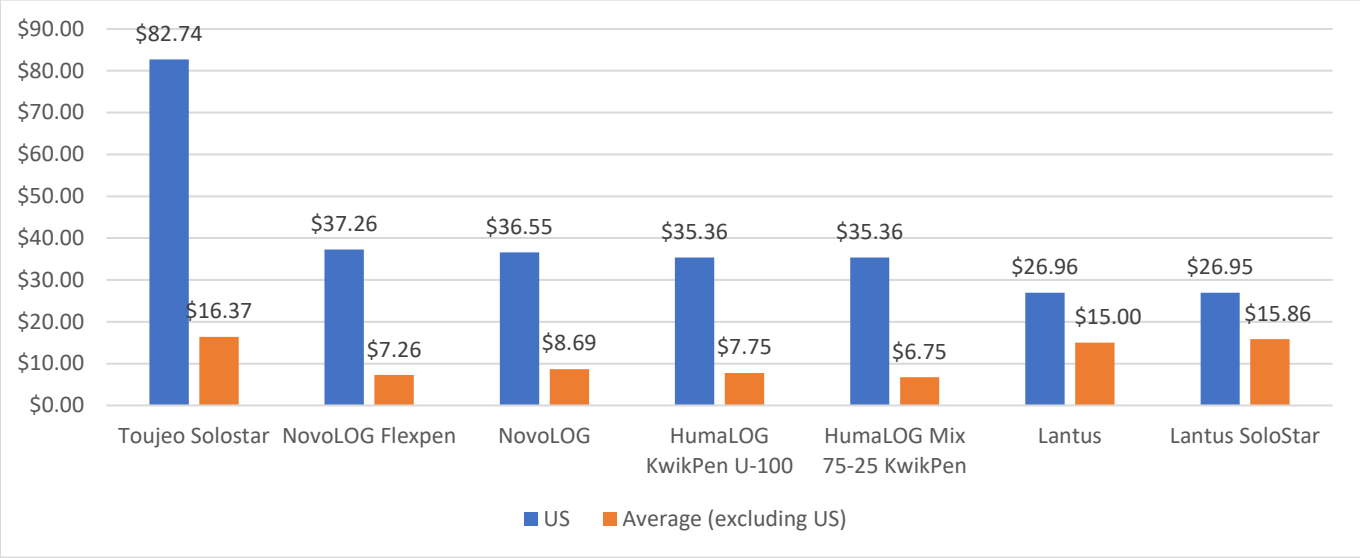
The U.S. spends $327 billion annually on costs associated with diabetes.[84] According to the Centers for Disease Control and Prevention (CDC), 30.3 million Americans suffered from diabetes in 2015, while the price of insulin increased by 197 percent from 2002 to 2013. [85] [86] Total Medicare Part D spending on insulin increased by 840 percent from $1.4 billion to $13.3 billion between 2007 and 2017, far outpacing the growth in number of beneficiaries using insulin.[87]

Six of the seven non-insulin medications used to treat Type 2 diabetes were priced 600 to 1,100 percent higher in the United States than abroad.

Based on our analysis, insulin averaged $34.75 per dose in the U.S., which is 247 percent of the $10.58 price in other countries. However, we found significant variation by drug. For example, Lantus SoloStar in the U.S. was 170 percent of the average in other countries, while the HumaLOG Mix 75-25 KwikPen was priced at 620 percent of the non-U.S. price. The Sanofi-Avertis-manufactured Lantus and Lantus SoloStar account for more than $4 billion of annual Medicare spending.[88] [89] Figure 5 shows price differentials between the U.S. and the average non-U.S. price for a select set of insulin drugs.

[82] Januvia (2019). *Merck Sharp & Dohme Corp*. Retrieved from https://www.januvia.com/
[83] What is Janumet (2019). *Merck Sharp & Dohme Corp.* Retrieved from https://www.janumetxr.com/sitagliptin_metformin_HCL/janumetxr/consumer/what-is-janumet/index.xhtml
[84] Cefalu, WT, Dawes, DE, Gavlak, G, Goldman, D, Herman, WH, Van Nuys, KV, et al. (2018). Insulin Access and Affordability Working Group: Conclusions and Recommendations. *Diabetes Care*. Retrieved from https://doi.org/10.2337/dci18-0019
[85] *Id.*
[86] Squires, E, Duber, H, Campbell, M, Cao, J, Chapin, A, Horst, C, et al. (2018). Health Care Spending on Diabetes in the U.S., 1996-2013. *Diabetes Care 41*: 1423-1431.
[87] Cubanski, Juliette and Neuman, Tricia (2019). How Much Does Medicare Spend on Insulin. *Henry J Kaiser Family Foundation*. Retrieved from https://www.kff.org/medicare/issue-brief/how-much-does-medicare-spend-on-insulin/
[88] Using Lantus (2019). *Sanofi-Aventis US LLC*. Retrieved from https://www.lantus.com/using-solostar-insulin-pen
[89] Medicare Part D Drug Spending Dashboard (2019). *Centers for Medicare and Medicaid Services*. Retrieved from https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Information-on-Prescription-Drugs/MedicarePartD.html

Figure 5. Select Insulin Drug Prices, 2018[90]



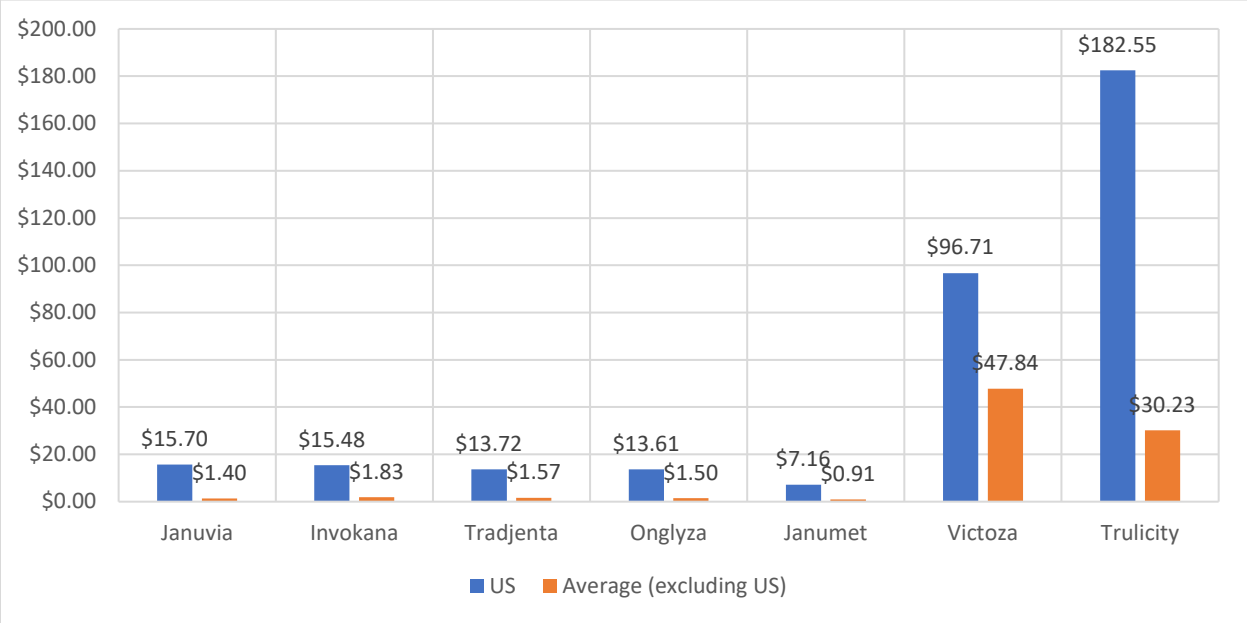
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Information on the types of insulin were retrieved from Cleveland Clinic "Injectable Insulin Medications" article.*

Insulin medications tended to have price differentials close to the average U.S.-international price differential, but non-insulin diabetes medications had much higher prices compared to the international average. Non-insulin Type 2 diabetes medications averaged $49.28 per dose in the U.S., 526 percent of the non-U.S. international average of $12.70. The U.S. price for Victoza was 278 percent of the non-U.S. international average, while Onglyza and Tradjenta were priced at about 900 percent of the non-U.S. international average. Januvia was priced at $15.70 in the U.S., compared to an international average of $1.40 – a price differential of 1,020 percent. The seven non-insulin medications used to treat Type 2 diabetes were priced 178 to 1,020 percent higher in the U.S. compared to the international average price. Figure 6 shows the differential between the U.S. price and the average among the other 11 countries for all seven non-insulin Type 2 diabetes drugs in 2018.

The seven non-insulin medications used to treat Type 2 diabetes were priced 178 to 1,020 percent higher in the U.S. compared to the international average price.

[90] Injectable Insulin Medications (2019). *Cleveland Clinic*. Retrieved from https://my.clevelandclinic.org/health/drugs/13902-injectable-insulin-medications

Figure 6. Non-Insulin Medication Used to Treat Type 2 Diabetes Drug Prices, 2018[91]



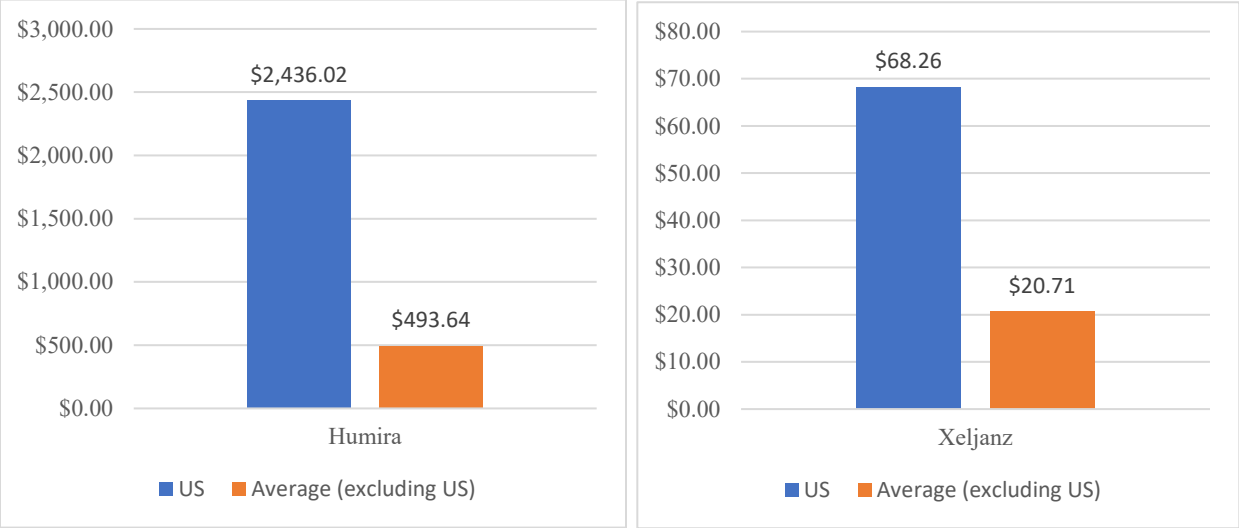
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Information on the types of insulin were retrieved from Cleveland Clinic "Diabetes: Non-Insulin Injectable Medications" article.*

Arthritis Medication

Humira, an anti-inflammatory drug, is the best-selling prescription drug in the world.[92] Since 2012, it has doubled in price in the U.S., and is currently priced at $2,436.02 per dose, or about 500 percent of the international average.[93] After the U.S., the next highest price for Humira is in Denmark where it costs $787.10 per dose, less than one-third of the U.S. price. Xeljanz, another arthritis medication, is priced much lower than Humira, but is still over 300 percent more expensive in the U.S. compared to the international average. Figure 7 depicts differences in the price of Humira and Xeljanz in the U.S. relative to the other 11 countries in this analysis.

[91] Injectable Insulin Medications (2019). *Cleveland Clinic*. Retrieved from https://my.clevelandclinic.org/health/drugs/13902-injectable-insulin-medications
[92] Hakim, Danny (2018). Humira's Best-Selling Drug Formula: Start at a High Price. *The New York Times*. Retrieved from https://www.nytimes.com/2018/01/06/business/humira-drug-prices.html
[93] *Id.*

Figure 7. Humira and Xeljanz Prices, 2018[94]



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Information on brand name arthritis medication retrieved from the Arthritis Foundation "Drug Guide" database.*

Multiple Sclerosis Medication

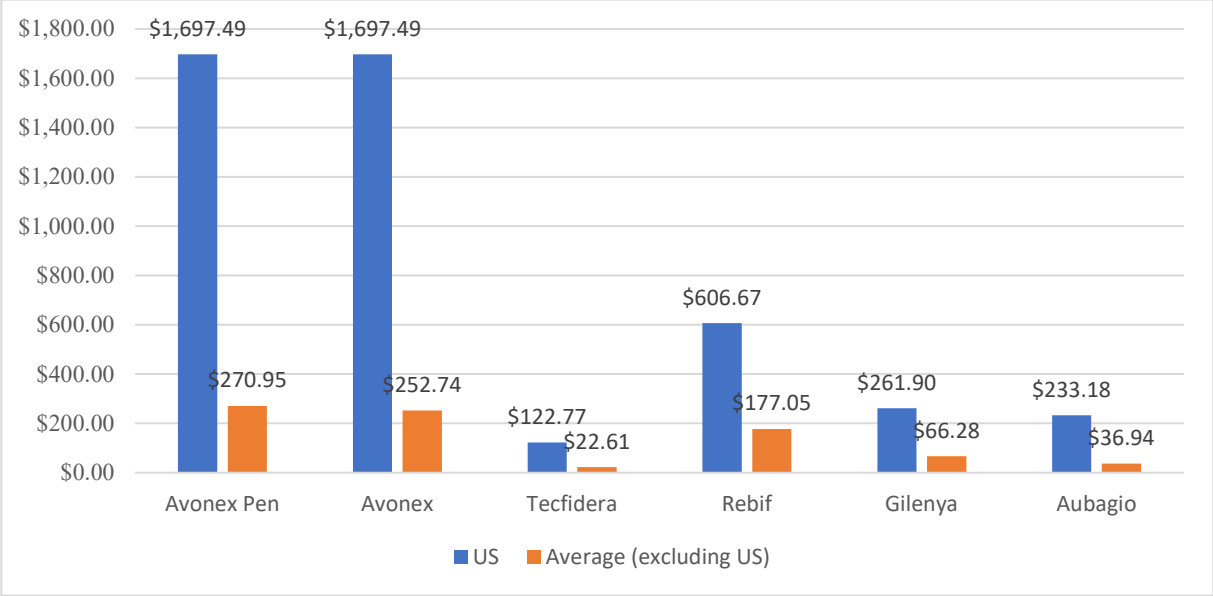
Patients with Multiple Sclerosis (MS) saw their yearly cost-sharing increase more than sevenfold over the past decade.[95] The MS drugs in our sample were typically priced in the U.S from 350 percent to 670 percent of the international average. Avonex and Avonex Pen from Biogen, Inc. have a U.S. list price of $1,697.49 close to 650 percent of the international average times the average international price (see Figure 8).[96] The average U.S. list price for MS drugs was $769.92 per dose, compared to only $133.99 per dose internationally, making these drugs 5.75 times more expensive in the U.S. compared to the average international price.

[94] Drug Guide (n.d.). *Arthritis Foundation*. Retrieved from https://www.arthritis.org/living-with-arthritis/treatments/medication/drug-guide/

[95] Norton, Amy (2019). For Medicare Patients, Costs of MS Drugs Rise Sevefold Over 10 Years. *US News.* Retrieved from https://www.usnews.com/news/health-news/articles/2019-08-28/for-medicare-patients-costs-of-ms-drugs-rise-sevenfold-over-10-years

[96] Product Portfolio (2019). *Biogen.* Retrieved from https://www.biogen.com/en_us/product-portfolio.html

Figure 8. Select Multiple Sclerosis Prescription Drug Prices, 2018[97]



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Information on types of Multiple Sclerosis medication provided by National Multiple Sclerosis Society.*

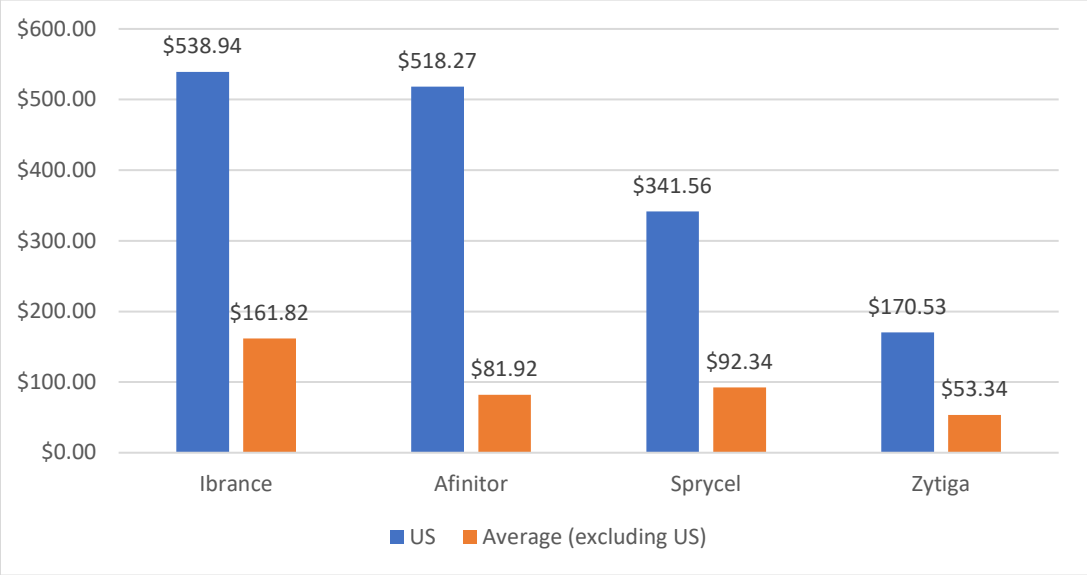
Cancer Medication

Most new cancer medications were priced at over $100,000 per patient per year in the U.S. [98] According to the National Cancer Institute, 90 percent of Americans say cancer drugs are too expensive.[99] The U.S. list price for the nine cancer medications included in this analysis ranged from $90.88 to $791.66 per dose with a per-dose average of $342.48. The international average of these same drugs cost $93.29 per dose – 27 percent of the U.S. price.

Figure 9 highlights four of these drugs. Afinitor, manufactured by Novartis, had the largest U.S.-international price differential of the nine cancer drugs, with the U.S. price set almost 700 percent higher than the international average. The other oncology drugs were priced closer to the average U.S.-international price differential ratio, ranging from 158 percent to 420 percent of the average international price.

[97] Medication (n.d.) National Multiple Sclreosis Society. Retrieved from https://www.nationalmssociety.org/Treating-MS/Medications
[98] Urging Affordable Access to High-Value Cancer Drugs (2018). *National Cancer Institute at the National Institute of Health*. Retrieved from https://www.cancer.gov/news-events/cancer-currents-blog/2018/affordable-access-to-cancer-drugs-infographic
[99] *Id.*

Figure 9. Select Cancer Medication Ex-Factory Prices in Select Countries, 2018[100]



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Information on brand-name cancer medication provided by National Cancer Institute.*

4. Comparison of United States and Germany Rebate Rates and Price Differentials

One of the major arguments from the pharmaceutical industry on these international price differentials is that while list prices are much higher in the U.S., the rebates offered are also significantly higher, so the net price is comparable. To test this claim, we compared rebate rates in the U.S. to those in Germany, the only publicly available national data on rebate rates for the countries we studied.

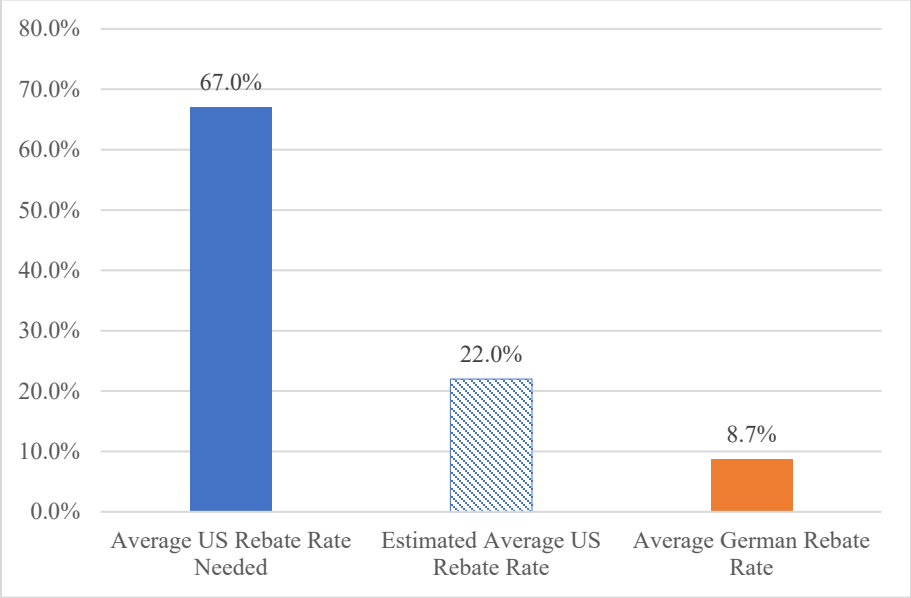
Table 4 in Appendix B shows drugs in our dataset that were available in both Germany and the U.S. for this analysis, along with the German rebate on those drugs and the U.S. rebate that would be required for U.S. prices to match German prices. German rebate rates are relatively low compared to U.S. rebates, averaging 8.72 percent and ranging from 0 to 35 percent. There were no rebates offered on 15 of the 66 drugs in Germany for which we had data. On average, U.S. rebate rates would need to average 67 percent to match average German net prices. According to the CBO the average rebate rate for band name drugs was 22 percent in 2015.[101] The largest rebate of these would need to be applied to Advair Diskus, with a U.S. price of $12.27 and a net price of $0.46 in Germany to make the net prices equivalent in the two countries.

U.S. rebate rates would need to average 67 percent to match average German net prices.

[100] A to Z list of Cancer Drugs (n.d.). *National Cancer Institute at the National Institute of Health*. Retrieved from https://www.cancer.gov/about-cancer/treatment/drugs

[101] Prices for and Spending on Specialty Drugs in Medicare Part D and Medicaid (2019). *Congressional Budget Office*. Retrieved from https://www.cbo.gov/system/files/2019-03/54964-Specialty_Drugs.pdf

Figure 10. U.S. Rebate Rate Required to Match German Net Prices, 2018[102]



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Information on estimated average U.S. rebate rate retrieved from the March 2019 CBO report on specialty drugs, which disclosed the 2015 rebate rate on brand-name drugs as 22 percent.*

5. Comparison of United States and International Rebate Rates and Price Differentials

Table 2 shows the average drug prices across the study sample and the rebate rate that would be required to lower U.S. list prices to match those in other countries. The average U.S. rebate rate would need to be about 73.3 percent for its net drug prices to match list prices in the other 11 countries in the study. When excluding Portugal from this study, the average U.S. rebate rate would need to be about 72.3 percent for its net prices to match list prices in the other 10 countries.

[102] Prices for and Spending on Specialty Drugs in Medicare Part D and Medicaid (2019). *Congressional Budget Office*. Retrieved from https://www.cbo.gov/system/files/2019-03/54964-Specialty_Drugs.pdf

Table 2. U.S. Rebate Rate Required to Match Select Countries Ex-Factory Prices, 2018

Drug Prices Listed for Each Country			
Country	**Average Price**	**US Rebate Rate Needed**	**Drugs Listed**
U.S.	$466.15	-	79
UK	$105.45	77.4%	78
Japan	$69.50	85.1%	58
Canada (Ontario)	$132.59	71.6%	47
Australia	$113.57	75.6%	62
Portugal	$82.97	82.2%	37
France	$104.51	77.6%	54
Netherlands	$152.86	67.2%	61
Germany	$165.01	64.6%	65
Denmark	$182.29	60.9%	65
Sweden	$143.91	69.1%	59
Switzerland	$116.22	75.1%	72
Average	$152.92	***73.3%***	***61.4***

SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources.*

6. Estimation of Medicare Part D Savings under External Reference Pricing System

In 2016, the U.S. spent $457 billion on prescription drugs and Medicare Part D alone spent $99.5 billion on prescription drugs. [103] Using our basket of comparison drugs (i.e., an index of drug's average price across all 11 non-U.S. countries; for more details, please see Appendix A), we estimated potential Medicare Part D savings under a foreign pricing index model by averaging list prices across all other countries. We replicated this comparison using both German and U.K. drug prices as a benchmark.

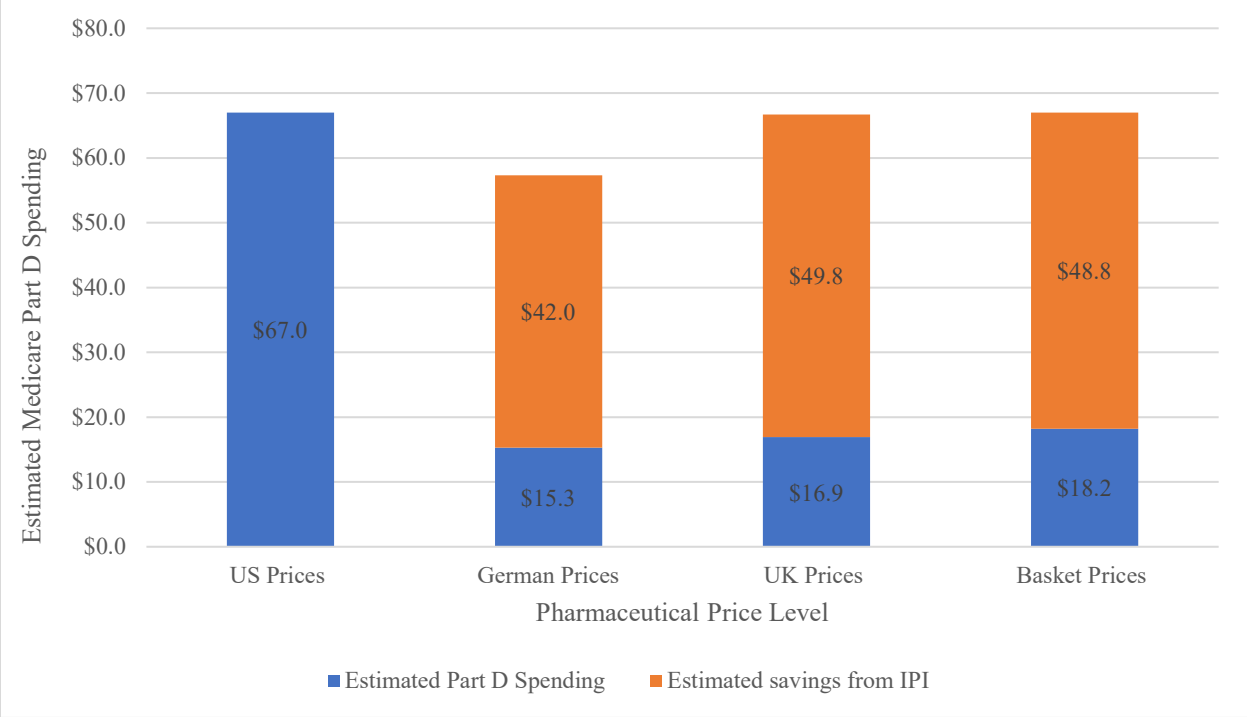
Comparing U.S. drug prices to the prices charged in other developed nations could reduce estimated Part D spending by 69.6 percent to 73.7 percent, resulting in $69 to $71 billion in annual Medicare Part D savings.

As shown in Figure 11, the U.S. spent an estimated $67 billion in 2018 on the 79 drugs in our sample through Medicare Part D plans. Purchasing these same drugs using the "basket list price" would reduce estimated Part D spending by $48.8 billion. Purchasing these same drugs using U.K. prices would reduce estimated Part D spending to $49.8 billion. Likewise, using German prices would reduce estimated Part D spending by $42 billion. Comparing U.S. drug

[103] 10 Essential Facts About Medicare and Prescription Drug Spending (2019). *Henry J. Kaiser Family Foundation.* Retrieved from https://www.kff.org/infographic/10-essential-facts-about-medicare-and-prescription-drug-spending/

prices to the prices charged in other developed nations could reduce estimated Part D spending by 72.8 to 74.7 percent, resulting in between $72 and $74 billion in Medicare Part D savings annually. Due to data constraints, these estimates are based on list rather than retail drug prices, meaning that the potential savings presented in Figure 11 are likely overestimated. The actual savings would likely still be significant, however.

Figure 11. Estimated Medicare Part D Savings at Three Different IPI Rates (Billions of U.S. Dollars), 2018



***SOURCES* and NOTES**: *Authors' analysis of price data for 2018, collected from recognized price sources. Due to data constraints, these estimates are based on list rather than retail drug prices, meaning that the potential savings presented here are likely overestimated. The actual savings would likely still be significant, however.*

Discussion

The analysis presented in this report clearly illustrates that, across the board, the U.S. spends more on drugs than other comparable developed countries. The extent of these pricing differentials varies by drug, manufacturer, and disease group, but the results we present make a compelling case for the existence of large differences between the U.S. drug pricing system and other countries, as well as the associated negative effect those differences have on the American consumer and taxpayer. Even when accounting for rebates, U.S. consumers pay significantly more for drugs than consumers in comparator nations.

The results we present are meant neither to make a case for one non-U.S. system versus another, nor to determine the individual factors driving the differences in pricing between the U.S. and the 11 comparator countries in this study. But the results clearly show that Americans are paying more for the same drugs, leading many policymakers to look abroad for models that work better in reigning in costs.

A Call for Help: Medicare Part D Negotiation

In response to the rising cost of drugs – particularly in Medicare Part D, where the bulk of Medicare drug dollars are spent – many experts and stakeholders have called for Medicare to negotiate the price of prescription drugs on behalf of beneficiaries.[104] Current U.S. law explicitly prohibits the Secretary from negotiating with manufacturers and, instead, requires prescription drug plans (PDPs) to negotiate directly with drug manufacturers to obtain drug discounts (rebates) for patients. [105]

Proponents believe that Medicare could leverage its massive purchasing power better than individual Part D plans to drive down drug costs.

Allowing the Secretary to negotiate drug prices on behalf of Medicare beneficiaries has overwhelming public support – 86 percent across political parties, 90 percent of Democrats, 80 percent of Republicans, and 87 percent of Independents.[106] Proponents believe that Medicare could leverage its massive purchasing power better than individual Part D plans to drive down drug costs.[107]

Despite the argument about the potential for a negotiation policy to limit access to treatments and therapies, patient groups continue to strongly support negotiation – and many

[104]Cubanski, J., and Neuman, T (2018). Searching for Savings in Medicare Drug Price Negotiations. *Henry J. Kaiser Family Foundation.* Retrieved from https://www.kff.org/medicare/issue-brief/searching-for-savings-in-medicare-drug-price-negotiations/

[105] *Id.*

[106] *Id.*

[107] Shih, C., Schwartz, J., and Coukell, A. (2016). How Would Government Negotiation of Medicare Part D Drug Prices Work? *Health Affairs Blog.* Available at: https://www.healthaffairs.org/do/10.1377/hblog20160201.052912/full/

experts have indicated this criticism is unfounded.[108] [109] In fact, between 2013 and 2017, the five largest U.S.-based drug companies spent 70 percent more on marketing and administrative costs than on R&D.[110] Furthermore, from 2006 to 2015, the 25 largest pharmaceutical companies witnessed their average sales revenues increase by $241 billion, while only increasing R&D funding by $7 billion.[111]

During the Committee on Ways and Means February 8, 2019, hearing entitled "The Cost of Rising Prescription Drug Prices," witness Rachel Sachs echoed these sentiments:

> *"These claims assume a whole host of other conditions, including that there are no other opportunities to obtain savings within pharmaceutical companies' current business models. It is not clear that this is the case, leading HHS [Department of Health and Human Services] Secretary Alex Azar – himself a former pharmaceutical company executive – to push back strongly against claims of lower innovation, calling them 'mathematically unbelievable.' There is room within the system as it exists today to realign incentives and lower drug prices without the dire impacts on innovation that pharmaceutical companies threaten."*

Considerations

The idea of having the Secretary negotiate drug prices on behalf of Medicare beneficiaries is not a new one, having taken center stage in the initial debates that ultimately created the Part D benefit through the MMA of 2003. Through those legislative negotiations, Congress ultimately landed on a private-market-driven drug coverage program, through which private plans would compete on the basis of cost and coverage, negotiating drug prices directly with drug manufacturers. [112]

The MMA included a "noninterference" clause, which effectively barred the Secretary from negotiating drug prices.[113] The law states that the Secretary "(1) may not interfere with the negotiations between drug manufacturers and pharmacies and PDP sponsors; and (2) may not require a particular formulary or institute a price structure for the reimbursement of covered part

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[108] New Ad: Fix the System; Let Medicare Negotiate Lower Drug Prices (2018). *Patients for Affordable Drugs.* Retrieved from https://www.patientsforaffordabledrugs.org/2018/07/25/let-medicare-negotiate/

[109] Statement on the introduction of the Medicare Negotiation and Competitive Licensing Act (2019). *Families USA.* 2019. Retrieved from https://familiesusa.org/press-release/2019/statement-introduction-medicare-negotiation-and-competitive-licensing-act

[110] Top 5 US-based companies determined by market cap taken 11/12/2018 (JNJ, PFE, MRK, ABBV, AMGN). Annual research and development (R&D) and selling, marketing and administrative (SG&A) spending reported in annual filings.

[111] Drug Industry Profits, Research and Development Spending, and Merger and Acquisition Deals (2017). *Government Accountability Office.* 2017. Retrieved from *https://oversight.house.gov/sites/democrats.oversight.house.gov/files/688472.pdf*

[112] Cubanski, J., and Neuman, T. (2018). Searching for Savings in Medicare Drug Price Negotiations. *Henry J. Kaiser Family Foundation.* Available at: https://www.kff.org/medicare/issue-brief/searching-for-savings-in-medicare-drug-price-negotiations/

[113] H.R. 1 – Medicare Prescription Drug Improvement, and Modernization Act of 2003. *Congress.gov*. Retrieved from https://www.congress.gov/bill/108th-congress/house-bill/1

D drugs."[114] Such language ties the Secretary's hands in a manner that distinguishes Medicare from other federal programs, like Medicaid, which mandates the program receive rebates, and the Department of Veterans Affairs (VA), which will not pay more than the lowest price private-sector purchasers pay. The noninterference clause also makes Part D distinct from the rest of Medicare, which sets the amount it pays doctors and hospitals, for example.

Despite the MMA's market-based structure, a majority of Americans supported a policy to eliminate the noninterference clause even as early as 2006.[115] A bill to allow the Secretary negotiating authority passed the U.S. House of Representatives in 2007, but the Senate did not take it up.[116]

A key concern pertaining to a negotiation policy revolves around CBO's assertion that the 2007 House bill would have a "negligible effect on federal spending" because "the Secretary would not be able to negotiate prices that further reduce federal spending to a significant degree," according to CBO's 2004 assessment of the policy.[117] In other words, because the 2007 bill only struck the noninterference clause and did not give the Secretary any additional tools for negotiating drug prices beyond what the Part D plans already had, CBO concluded that the bill would not achieve Part D savings. By simply striking the noninterference clause, CBO assumed that the Secretary would not have a sufficient "hammer" on prescription drug manufacturers to bring them to the negotiating table and agree to lower drug prices for the Medicare program. In response to questions relating to the 2007 House bill, CBO found:[118]

> *The key factor in determining whether negotiations would lead to price reductions is the leverage that the Secretary would have to secure larger price concessions from drug manufacturers than competing PDPs currently obtain. When several drugs are available to treat the same medical condition, PDPs can secure rebates from selected drug manufacturers by giving their drugs preferred status within formularies. Because enrollees are encouraged to use such preferred drugs (through lower cost-sharing requirements), manufacturers are willing to offer price concessions to the PDPs in order to give their drugs preferred status and thereby increase their market share. By itself, giving the Secretary broad authority to negotiate drug prices would not provide the leverage necessary to generate lower prices than those obtained by PDPs and thus would have a negligible effect on Medicare drug spending. Negotiation is likely to be effective only if it is accompanied by some source of pressure on drug manufacturers to secure price concessions. The authority to establish a formulary, set prices administratively, or take other regulatory actions against firms failing to offer price reductions could give the*

[114] *Id.*
[115] Cubanski, J., and Neuman, T. (2018). Searching for Savings in Medicare Drug Price Negotiations. *Henry J. Kaiser Family Foundation.* Available at: https://www.kff.org/medicare/issue-brief/searching-for-savings-in-medicare-drug-price-negotiations/
[116] H.R. 4 – Medicare Prescription Drug Price Negotiation Act of 2007. *Congress.gov*. Retrieved from https://www.congress.gov/bill/110th-congress/house-bill/4
[117] Letter to the Honorable William H. Frist, M.D. (2004). *Congressional Budget Office*. Retrieved from https://www.cbo.gov/sites/default/files/108th-congress-2003-2004/reports/fristletter.pdf
[118]Letter to Honorable Ron Wyden (2007). *Congressional Budget Office*. Retrieved from https://www.cbo.gov/sites/default/files/110th-congress-2007-2008/reports/drugpricenegotiation.pdf

Secretary the ability to obtain significant discounts in negotiations with drug manufacturers.

CBO has since suggested that legislation could generate savings by, for example, establishing a formulary that excludes some drugs or uses other utilization management restrictions.[119] CBO also suggested savings could accrue from policies that allowed the Secretary to set drug prices or take some kind of action against companies that did not negotiate in good faith. [120] To date, CBO has not released a score of any of these policies (or a combination thereof) that give the Secretary additional tools for negotiating lower prices than the plans. Independent researchers have estimated that the federal government could save between $15.2 and $16 billion annually if Medicare negotiated the same prices Medicaid and the VA currently pay. [121]

Conclusions

The results from this study clearly show that a new approach is needed in the U.S. to provide more equitable drug prices to consumers – one that ensures American families are not unfairly bearing the burden of much higher prices to fuel drug companies' profits. A policy of Medicare prescription drug negotiation using international prices would help rebalance a distortion created by Medicare's overpaying for drugs that could yield significant savings for American families. Given that one in four Americans report taking four or more medications, action in Medicare alone is not enough, as 180 million Americans with employer coverage also struggle with prescription drug bills.[122] [123] [124] Efforts at lowering consumers' costs need to be broad in scope so that all Americans are getting a fair deal in what they pay for drugs.

Experiences abroad can provide policymakers with a better understanding of their own system, but the solution to the drug pricing crisis lies within the U.S.'s domestic policy context and history. One element is certain, though: The system in place now does not work for the Americans who depend on it, and change, however challenging, is paramount.

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[119] Letter to Honorable Ron Wyden (2007). Congressional Budget Office. Retrieved from https://www.cbo.gov/sites/default/files/110th-congress-2007-2008/reports/drugpricenegotiation.pdf

[120] *Id.*

[121] Shih, C., Schwartz, J., and Coukell, A. (2016). How Would Government Negotiation of Medicare Part D Drug Prices Work? *Health Affairs Blog.* Available at: https://www.healthaffairs.org/do/10.1377/hblog20160201.052912/full/

[122] Public Opinion on Prescription Drugs and Their Prices (2019). *Henry J. Kaiser Family Foundation.* Retrieved from https://www.kff.org/slideshow/public-opinion-on-prescription-drugs-and-their-prices/

[123] AHIP Launches Coverage@Work Campaign Showcasing How Employer-Provided Coverage Delivers for 180 Million Americans (2018) *America's Health Insurance Plans*. Retrieved from https://www.ahip.org/coveragework-press-release/

[124] Rae, M., Copeland, R., & Cox, C. (n.d.). Tracking the rise in premium contributions and cost-sharing for families with large employer coverage. *Health Systems Tracker.* Retrieved from https://www.healthsystemtracker.org/brief/tracking-the-rise-in-premium-contributions-and-cost-sharing-for-families-with-large-employer-coverage/?_hsenc=p2ANqtz--vCGhhfJpJXBuK7qSOv6h0fmd0N6ggVbxRJENcfWGq6ioPAeOm202D0jlQ5kLESxSOi6N0dOkByCmxlAr2r0MHvH3DJw&_hsmi=75726948&utm_campaign=KFF-2019-Health-Costs&utm_source=hs_email&utm_medium=email&utm_content=75726948

Appendix A: Methodology

Below, we describe the methodology used to construct our analytic file and conduct the analyses for this study.

Sample

Drug sample. The sample of 79 single-source brand-name drugs used for this report comes from an analysis So-Yeon Kang et al. (2019) conducted that examined the price differentials of drugs that did not have generic competitors between drug prices in the U.S. and those in Canada, Japan, and the U.K.[125] They created the 79-drug sample by first examining 163 brand-name drugs that accounted for 70 percent of total spending in Medicare Part D. Then, they eliminated all multisource drugs that had generic substitutes in the countries examined to produce the 79-drug sample. According to 2017 CMS data, these 79 drugs accounted for almost 60 percent of total Medicare Part D spending or over $57.9 billion of the estimated $99.5 billion total Part D costs.[126] [127] [128]

Country cohort. To understand the variation in prices of these 79 drugs, we selected a cohort of comparison countries that either use an ERP system or have similar per capita income levels to the cohort (but a non-ERP system). For more information on the key characteristics of the non-U.S. countries included in this analysis, please see Appendix C.

Data Sources and Database

For the 12 countries included in this analysis, we used publicly available 2018 pharmaceutical ex-factory pricing data to compare drug prices. Table 3 provides an overview of the data source for each country's drug prices, along with the number of the 79 drugs available in the database. We aggregated drug pricing data from these sources into a single Excel database by cross-walking the files by the active ingredient variable and/or brand-name variables to create an analytic file with the brand-name, dosage, manufacturer, 2017 U.S. Medicare Part D spending, and 2017 beneficiary utilization data, among other variables.

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[125] Kang, So-Yeon et. al. (2019). Using External Reference Pricing in Medicare Part D to Reduce Drug price Differentials with Other Countries. *Health Affairs Blog*. Retrieved from https://www.healthaffairs.org/doi/pdf/10.1377/hlthaff.2018.05207

[126] Medicare Part D Drug Spending Dashboard (2019). *Centers for Medicare and Medicaid Services*. Retrieved from https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Information-on-Prescription-Drugs/MedicarePartD.html

[127] The Medicare Prescription Drug Program (Part D): Status Report. *Medicare Payment Advisory Commission, March 2019, 385.* http://www.medpac.gov/docs/default-source/reports/mar19_medpac_ch14_sec.pdf?sfvrsn=0

[128] 10 Essential Facts About Medicare and Prescription Drug Spending (2019). *Henry J. Kaiser Family Foundation.* Retrieved from https://www.kff.org/infographic/10-essential-facts-about-medicare-and-prescription-drug-spending/

Table 3. Prescription Drug Price Data Sources for Select Countries, 2018

Pharmaceutical Price Sources		
Country	**Pharmaceutical Price Source**	**Drugs Listed**
U.S.	Medi-Span[129]	79
UK	Monthly Index of Medical Specialties[130]	78
Japan	Ministry of Health, Labor and Welfare[131]	58
Canada (Ontario)	Ontario Drug Benefit Formulary[132]	47
Australia	Pharmaceutical Benefits Scheme[133]	62
Portugal	National Authority of Medicines and Health products[134]	37
France	Ministry of Health[135]	54
Netherlands	College voor Zorgverzekeringen[136]	61
Germany	Lauer-Taxe[137]	66
Denmark	Medicin Priser[138]	65
Sweden	Dental and Pharmaceutical Benefits Agency (TLV)[139]	59
Switzerland	Federal Office for Public Health[140]	71

Analysis

Results presented in this paper are based on a six-step analysis described in detail below.

1. Descriptive Statistics

First, we calculated summary statistics on prescription drug prices for all 12 countries, across all 79 drugs for which data were available. Statistics included: average price, minimum

[129] Medi-Span Price Rx (2019). *Wolters Kluwer*. Retrieved from https://www.wolterskluwer cdi.com/price-rx/
[130] MIMS (2018). *Haymarket media Group Ltd*. Retrieved from https://www.mims.co.uk/
[131] Drug price list and information on generic drugs (2018). *Ministry of Health, Labour, and Welfare*. Retrieved from https://www5.cao.go.jp/keizai-shimon/kaigi/special/reform/wg1/291018/sankou2.pdf20
[132] Formulary Search (2018). *Ontario Ministry of Health and Long-Term Care*. Retrieved from https://www.formulary.health.gov.on.ca/formulary/
[133] The Pharmaceutical Benefits Scheme (2019). *Commonwealth of Australia*. Retrieved from http://www.pbs.gov.au/browse/medicine-listing
[134] Infarmed Base de Dados de Medicamentos (2018). *Republica Portuguesa*. Retrieved from http://app7.infarmed.pt/infomed/
[135] Ministere des Affaires Sociales et de la Sante (2018). *Republique Francaise*. http://medicprix.sante.gouv.fr/welcome.do
[136] Zoe Keen Geneesmiddel (2018). *Zorginsituut Nederland*. Retrieved from https://www.medicijnkosten.nl/
[137] Arzneimittel Recherchieren (2019). *Deutsches Institut fur Medizinische Dokumentation und Information*. Retrieved from https://www.dimdi.de/static/en/amg/fbag/index.htm
[138] Medicin Priser (2019). *Laegemiddel Styrelsen: Danish Medicines Agency*. Retrieved from https://www.medicinpriser.dk/default.aspx
[139] Lakemedel (2018). *Tandvards-Och Lakemedelsformans Verket*, Retrieved from https://www.tlv.se/lakemedel.html
[140] Bundesamt fur Gesundheit BAG (2019). *Schweizerische Eldgenossenschaft*. Retrieved from http://www.xn--spezialittenliste-yqb.ch/ShowPreparations.aspx

price, maximum price, sum of drug prices, and number of drugs available for each country. We determined ex-factory unit price per standard dose (the prices at which manufacturers sell their products to wholesalers) for any available brand-name drug on the drug list. In the U.S., this price corresponds to the wholesaler acquisition cost (WAC), published in the Medi-Span database.[141] Similar to So-Yeon Kang et al.'s analysis, we used average exchange rates from the second quarter in 2018 to convert local currency prices to U.S. dollars to ensure price comparability across foreign markets. [142]

2. Factors Influencing Price Differentials

Second, we reviewed in-country factors that have the potential to drive price differentials between countries. One claim for higher drug prices in the U.S. is that its GDP per capita is higher than many other countries, which allows Americans to afford to pay higher prices and, thus, the market to charge more.[143] To assess this claim, we compared GDP per capita (as provided by the World Bank)[144] and price differentials between the U.S. and the other 11 countries in our dataset. We calculated each country's 2018 GDP per capita as a percent of the 2018 U.S. GDP per capita. For each of the other 11 countries, we then compared its GDP per capita as a percent of the U.S. GDP per capita to its average drug price as a percent of the U.S. average drug price.

3. International Comparison of Average Prescription Drug Prices

Third, we compared the average prescription drug prices in the U.S. with average prices in the other 11 countries for the sample of drugs in our dataset. As 31 manufacturers represented the 79 drugs in our dataset, we were also interested in understanding trends in these average price differentials by manufacturers. For the purposes of this analysis, we focused on seven companies representing multiple drugs in the dataset: Biogen Inc., Boehringer Ingelheim, Eli Lily & Company, Janssen Pharamceutica, Merck, Novartis, and Sanofi-Aventis. For each of the selected drugs, we calculated the average ex-factory price from all countries except the U.S. and compared this to the U.S.'s drug price, whenever price data were available.

Similarly, we conducted a comparative analysis along seven disease groups, which included medications to treat arthritis, multiple sclerosis (MS), cancer, diabetes, HIV/pulmonary hypertension, and hepatitis C. For each of the selected drugs, we calculated the average ex-factory price from all countries except the U.S. and compared this to the U.S.'s drug price, whenever price data were available.

4. Comparison of United States and Germany Rebate Rates and Price Differentials

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[141] Medi-Span Price Rx (2019). *Wolters Kluwer*. Retrieved from https://www.wolterskluwer cdi.com/price-rx/
[142] Kang, So-Yeon et. al. (2019). Using External Reference Pricing in Medicare Part D to Reduce Drug price Differentials with Other Countries. *Health Affairs Blog*. Retrieved from https://www.healthaffairs.org/doi/pdf/10.1377/hlthaff.2018.05207
[143] National Center for BioTechnology Information . (2017). Making Medicines Affordable: A National Imperative. Making Medicines Affordable: A National Imperative. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK493099/
[144] GDP per Capita (2019). *The World Bank*. Retrieved from https://data.worldbank.org/indicator/NY.GDP.PCAP.CD

Fourth, we compared U.S.-Germany price differentials after rebates were considered. We chose Germany as a comparator country because, among the non-U.S. countries in our analysis, Germany was the only one with a database that included net prices and list prices. Compiling comparable U.S. data is difficult, however. So-Yeon Kang et. al's analysis estimated a U.S. post-rebate rate as the list price reduced by 17.8 percent, based on 2014 Medicare data for all brand name drugs in Medicare (i.e., Parts B and D). In 2016, the Medicare Trustees Report disclosed the manufacturer's rebate rate at 19.9 percent for all Part D drugs, but it did not break these rebates out for brand-name drugs specifically.[145] In March of 2019, CBO released the average rebate rate for all brand-name drugs in Medicare Part D.[146] From these figures, we assumed the average U.S. rebate rate of 22 percent based on the CBO report, though there is considerable variability between therapeutic class.[147]

5. Comparison of United States and International Rebate Rates and Price Differentials

Fifth, since we only had data for net prices in Germany, we relied on list prices for the comparative analysis of U.S.-international rebate rates. For each of the 12 countries in our cohort, we calculated the average ex-factory price across all available drugs in the database. To obtain the average rebate rate required in the U.S. for the average U.S. net price to match each country's average list price, we calculated the percent difference between the average ex-factory price in the U.S. and the other 11 countries in the dataset for each drug.

6. Estimation of Medicare Part D Savings under External Reference Pricing System

Finally, using the CMS Medicare Part D dashboard, we compiled data on Medicare Part D spending, the average dosage per Medicare Part D beneficiary, and the number of Medicare Part D beneficiaries using each drug for all 79 drugs in 2017.[148] We cross-walked these data with the 2018 U.S. list prices data to calculate 2018 Medicare Part D spending for the 79 drugs. [149] Since we did not have Medicare Part D spending, dosage, or beneficiary data for 2018, we assumed 2017 and 2018 dosage and beneficiary data remained stagnant.

We calculated each drug's average price across all 11 non-U.S. countries to create an average list price, or our "basket list price." We used this as a proxy for potential prices under a model that uses an international price benchmark. Similar to Belgium, Netherlands, Ireland, France, and Portugal's un-weighted ERP systems, we did not weight these averages. We then multiplied the basket list price by the number of 2017 Medicare beneficiaries as well as the average 2017 dosage units per beneficiary for all 79 drugs to create a proxy for total Medicare Part D spending under an ERP model. We then took the difference of the 2018 estimated total

[145] Kang, So-Yeon et. al. (2019). Using External Reference Pricing in Medicare Part D to Reduce Drug price Differentials with Other Countries. *Health Affairs Blog*. Retrieved from https://www.healthaffairs.org/doi/pdf/10.1377/hlthaff.2018.05207

[146] Prices for and Spending on Specialty Drugs in Medicare Part D and Medicaid (2019). *Congressional Budget Office*. Retrieved from https://www.cbo.gov/system/files/2019-03/54964-Specialty_Drugs.pdf

[147] Medicare Part D: Use of Pharmacy Benefit Managers and Efforts to Manage Drug Expenditures and Utilization (2019). *Government Accountability Office*. Retrieved from https://www.gao.gov/assets/710/700259.pdf

[148] Medicare Part D Drug Spending Dashboard (2019). *Centers for Medicare and Medicaid Services*. Retrieved from https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Information-on-Prescription-Drugs/MedicarePartD.html

[149] Medi-Span Price Rx (2019). *Wolters Kluwer*. Retrieved from https://www.wolterskluwer cdi.com/price-rx/

Medicare Part D spending for the 79 drugs (using 2018 U.S. list prices) and the estimated ERP Part D spending for the 79 drugs (using the basket list prices) to create an estimate of potential Medicare savings under an ERP model weighted by volume. We also calculated estimated Part D spending for the 79 drugs using both German and U.K. prices and calculated potential Medicare savings under ERP models that were also weighted by volume.

Limitations

This study had several limitations. First, data from Medicare Part D are outdated and most of the available information about rebates is based off information from 2014-2016. Our list prices are based on 2018 Medi-Span data, and our information about Medicare beneficiaries is based on 2017 information. Thus, the estimates provided in this report are approximations of potential savings.

Second, access to list price data is limited. Our selection of comparable countries was determined by available data; several otherwise similar countries (e.g., Sweden and Belgium) could not be included. Due to varied prices and data access issues, our analysis of Canada's prices is limited to the prices in Ontario.

Third, not all other countries sold the 79 drugs in our database or the data were not available. The U.K. was most similar to the U.S. with 78 out of 79 on the market. The number of drug prices listed ranged from 37 (Portugal) to 79 (U.S.). To mitigate this issue, we typically compared the average price in the United States to the average price across the other 11 countries.

Fourth, the data available to estimate rebate rates and savings under an ERP model were limited. We lacked data on rebate information and net prices across all countries, with the exception of Germany. Rebate rates are generally not published, and we, thus, used existing estimates to approximate the U.S. rebate rates. Most countries receive rebates, so the estimates of prices for the other countries are higher than what the countries actually pay. Due to data constraints, these estimates are based on list rather than retail drug prices, meaning that the potential savings may be overestimated. The actual savings would likely still be significant, however.

Finally, when calculating potential savings under an ERP model, our assessment assumed that an ERP would be the sole mechanism of price negotiation, which is unrealistic and overly simplistic. These estimated savings figures are likely overestimated. Additionally, our ERP model did not weight prices by purchasing power parity, market size, health disparities, or other differences between countries.

Appendix B: U.S. Rebate Rate Required to Match German Net Prices

Table 4. U.S. Rebate Rate Required to Match German Net Prices, 2018

U.S. Rebate Rate Required to Match German Net Prices					
Drugs	**U.S. Rebate Rate Required**	**German Rebate Rate**	**Drugs**	**U.S. Rebate Rate Required**	**German Rebate Rate**
Stelara	74%	7%	**Triumeq**	69%	0%
Forteo	63%	7%	**Xtandi**	69%	0%
Orencia	54%	7%	**Prezista**	58%	35%
Harvoni	56%	0%	**Trulicity**	89%	7%
Sovaldi	53%	0%	**Tivicay**	61%	0%
Humira	84%	7%	**Combigan**	89%	7%
Enbrel	68%	7%	**Toujeo SoloStar**	79%	7%
Avonex	79%	7%	**Sensipar**	65%	7%
Avonex Pen	79%	7%	**Isentress**	51%	7%
Pomalyst	56%	7%	**Reyataz**	48%	8%
Revlimid	61%	7%	**Levemir Flextouch**	61%	7%
Daklinza	61%	0%	**Lantus**	59%	9%
Ibrance	78%	0%	**Levemir**	62%	7%
Rebif	83%	12%	**HumaLOG KwikPen U-100**	75%	16%
Sprycel	78%	16%	**NovoLOG Flexpen**	74%	7%
Imbruvica	52%	0%	**HumaLOG Mix 75-25 KwikPen**	75%	16%
Jakafi	71%	7%	**Suboxone**	83%	12%
Opsumit	81%	7%	**Tecfidera**	94%	7%
Gilenya	79%	7%	**HumuLIN 70-30**	57%	10%
Zytiga	67%	0%	**Xifaxan**	84%	8%
Tracleer	71%	7%	**Xarelto**	81%	7%
Victoza	52%	7%	**Effient**	86%	16%
Ofev	70%	0%	**Vimpat**	77%	7%
NexAVAR	76%	7%	**Multaq**	86%	8%
Atripla	61%	7%	**Pradaxa**	79%	0%
Xeljanz	50%	0%	**Januvia**	93%	0%
Tasigna	74%	7%	**Eliquis**	84%	0%
Aubagio	88%	7%	**Brilinta**	83%	7%
Onglyza	94%	7%	**Ranexa**	85%	7%
Stribild	73%	7%	**Uloric**	91%	6%

U.S. Rebate Rate Required to Match German Net Prices					
Drugs	**U.S. Rebate Rate Required**	**German Rebate Rate**	**Drugs**	**U.S. Rebate Rate Required**	**German Rebate Rate**
Genvoya	72%	7%	**Janumet**	92%	0%
Advair Diskus	96%	0%	**-**	-	-
Average				**67%**	**8.7%**

SOURCES and NOTES: *Authors' analysis of price data for 2018 collected from recognized price sources.*

Appendix C: Country Profiles

Table 5. Profiles of Countries Studied with an ERP

Appendix B.1. Profiles of Countries Studied with an ERP							
Principle	**Canada**	**France**	**Germany**	**Japan**	**Netherlands**	**Portugal**	**Switzerland**
General							
Population (2017)	37.06M	66.99M	82.79M	126.8M	17.08M	10.31M	8.52M
GDP per capita in USD (2018)	$45,032.12	$41,463.60	$44,469.91	$39,286.70	$48,223.16	$21,136.30	$82,838.90
Current Health Expenditure (CHE) as % of GDP (2016)	10.53%	11.10%	11.0%	10.93%	10.90%	9.0%	12.25%
Expenditures on retail pharmaceuticals and other medical non-durables as % of CHE (2017)	16.7%	13.2%	14.1%	18.6%	7.50%	14.60%	13.50%
Drug Pricing System Overview							
Level of decision-making on pricing/reimbursement	Central	Central	Central	Central	Central	Central	Central
Scope of centralized pricing regulation	Reimbursable pharmaceuticals in outpatient sector	Reimbursable pharmaceuticals in outpatient sector	Prescription-only medicines	Reimbursable pharmaceuticals in the outpatient sector	Calculation of maximum prices, all pharmaceuticals	Outpatient sector; prescription-only medicines and reimbursable over the counter medicines (hospitals negotiate prices independently)	Reimbursable pharmaceuticals in the outpatient sector
Final decision	Ministry of Social Affairs and Health	Ministry of Social Affairs and Health	Federal Joint Committee	Ministry of Health, Labour, and Welfare	Ministry of Health, Welfare, and Sport	Outpatient sector: Ministry of Health;	Federal Office of Public Health

Appendix B.1. Profiles of Countries Studied with an ERP							
Principle	**Canada**	**France**	**Germany**	**Japan**	**Netherlands**	**Portugal**	**Switzerland**
						Inpatient Sector: INFARMED	
Free Pricing	No	No	Varies	No	No	No	No
External Reference Pricing	Yes	Yes (for ASMR I, II, or III)	Yes (as a secondary criterion during price negotiations)	Yes	Yes	Yes	Yes
Internal Reference Pricing	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Elements of Value-Based Pricing	Yes	Yes	Yes (AMNOG)	Yes	No	No	Yes
Referenced by (number of countries)	Not available	20	16	Not Available	15	15	Not available
Cost-sharing	Varies by Province	Depends on therapeutic value, patient, group; no cap; 90% of population uses voluntary health insurance, which covers cost-sharing	10% with a cap set at 2% of gross income per year for overall copayments	Not Available	Deductible rule (specific drugs may be excluded from the rule/not covered by the plan depending on the insurer) with a cap set at €345 per year	Depends on product, patient group, income and condition with no cap	10% copayment is applied to most medicines; patients pay a co-insurance rate of 20% for selecting an off-patent medicine priced above levels established by low-cost versions with the same active substance
Other	N/A	Negotiations	N/A	Clinical data analysis and negotiation	Negotiations (for high-cost orphan drugs)	Online auctions to set maximum price (inpatient sector, SPMS)	Health technology assessment and negotiations

Appendix B.1. Profiles of Countries Studied with an ERP							
Principle	**Canada**	**France**	**Germany**	**Japan**	**Netherlands**	**Portugal**	**Switzerland**
ERP Mechanisms							
Score of ERP	All inpatient drugs covered publicly and outpatient drugs that are covered by private insurance	Reimbursable pharmaceuticals (outpatient) and some inpatient medicines (not financed through the DRG-system)	Reimbursable prescription medicines with added benefit (outpatient)	Reimbursable pharmaceuticals (outpatient)	Outpatient and inpatient medicines	Reimbursable prescription and OTC medicines (outpatient)	Reimbursable medicines (outpatient)
Number of reference countries	6	4	15	Not Available	4	3	9
Reference countries	France, Germany, Italy, Sweden, Switzerland, and the U.K.	Germany, Italy, Spain, U.K.	Austria, Belgium, Czech, Denmark, Spain, Finland, France, Greece, Ireland, Italy, Netherlands, Portugal, Sweden, Slovakia, U.K.	Not Available	Belgium, Germany, France, U.K.	Spain, France, Slovakia	Austria, Belgium, Denmark, Finland, France, Germany, Netherlands, Sweden, and the U.K.
Calculation method	Highest price is set at the median of reference countries	Not Specified	Weighted based on market size and purchasing power parity	Depends on various factors	Average of all countries	Outpatient: country average; Inpatient: lowest price	Not specified (prices similar to reference countries and not lower than the lowest price)
Price Revision Timeframe	Not available	Ad hoc	Periodically for maximum reimbursement amount; reimbursement amounts after contract expiration	Ad hoc	Ad hoc	Annual	Every three years

SOURCES and NOTES: *Data on Population, GDP per capita, Current Health Expenditures (CHE) as a percent of GDP, and expenditures on retail pharmaceuticals and other medical non-durables as a percent of CHE were retrieved from the World Bank database. Information on the drug pricing system and ERP mechanisms for France, German, Netherlands, and Portugal were retrieved from "Pharmaceutical Regulation in 15 European Countries" by Dimitra Panteli et. al. (2016). Information on the drug pricing system and ERP mechanisms in Japan were retrieved from L.E.K Consulting LLC report entitled "New Realities of Drug Pricing and Access in Japan" (2017). Information on the drug pricing system and ERP mechanisms in Switzerland were retrieved from "Summaries of the National Drug Coverage and Pharmaceutical Pricing Policies" in 10 Countries by Steven Morgan (2016).*

Table 6. Profiles of Countries Studied without an ERP

Appendix B.2. Profiles of Countries Studied without an ERP				
Principle	**Australia**	**Denmark**	**Sweden**	**United Kingdom**
General				
Population (2017)	24.6M	5.749M	9.99M	66.04M
GDP per capita in USD (2018)	$53,779.94	$56,307.51	$53,442.01	$38,720.44
Current Health Expenditure (CHE) as % of GDP (2016)	9.25%	10.60%	10.93%	9.76%
Expenditures on retail pharmaceuticals and other medical non-durables as % of CHE (2017)	14.7%	6.3%	9.80%	11.90%
Drug Pricing System Overview				
Level of decision-making on pricing/reimbursement	Central	Central on whether pharmaceutical is reimbursable	Central	Central within the "Pharmaceutical Price Regulation Scheme" (PPRS)
Scope of centralized pricing regulation	Reimbursable pharmaceuticals in PBS market	None	Reimbursable pharmaceuticals in the outpatient sector	Authorized pharmaceuticals
Final Decision	Department of Health and Ageing (DHA)	Varies	National Social Insurance Board (NSIB)	England: Clinical Commissioning Groups Scotland: NHS Boards (“area drug committees”)
Free Pricing	No	Yes	No	Yes
External Reference Pricing	No	No	No	No
Internal Reference Pricing	Yes (F1 Drugs)	Yes	Yes	No
Elements of Value-Based Pricing	Yes	No	Yes	For specific products
Referenced by (number of countries)	Not Available	Not available	14	17
Cost-sharing	Up to $28.59 (USD) for most people	No	Depends on patient expenditure; cap set €238 within 12 months	About €10; no cap

Appendix B.2. Profiles of Countries Studied without an ERP				
Principle	**Australia**	**Denmark**	**Sweden**	**United Kingdom**
Other	Pharmacoeconomic evaluation	Competition (retail); Tendering (hospital)	Tendering	Clinical data analysis and Negotiation

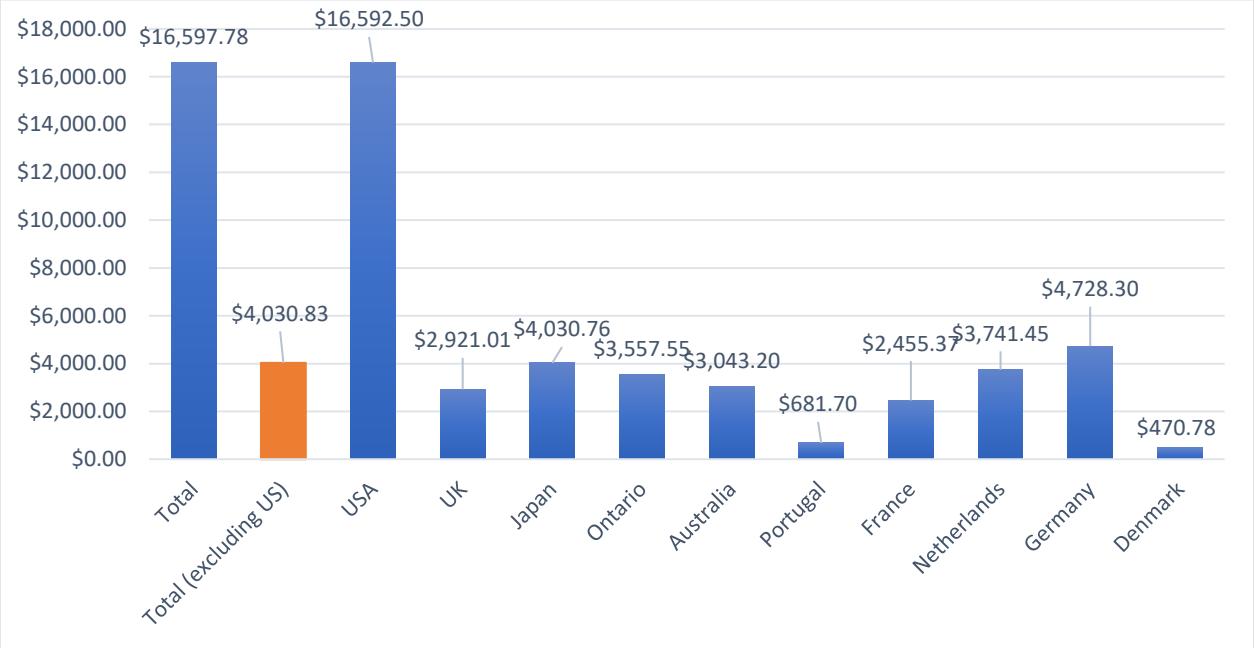
SOURCES and NOTES: *Data on Population, GDP per capita, CHE as a percent of GDP, and expenditures on retail pharmaceuticals and other medical non-durables as a percent of CHE were retrieved from the World Bank database. Information on the drug pricing system for Denmark, Sweden, and the United Kingdom were retrieved from "Pharmaceutical Regulation in 15 European Countries" by Dimitra Panteli et al. (2016). Information on the drug pricing system in Australia was retrieved from "Summaries of the National Drug Coverage and Pharmaceutical Pricing Policies in 10 Countries" by Steven Morgan (2016).*

Appendix D: International List Price Comparison – Overview

Figure 12. Average Pharmaceutical List Prices, 2018

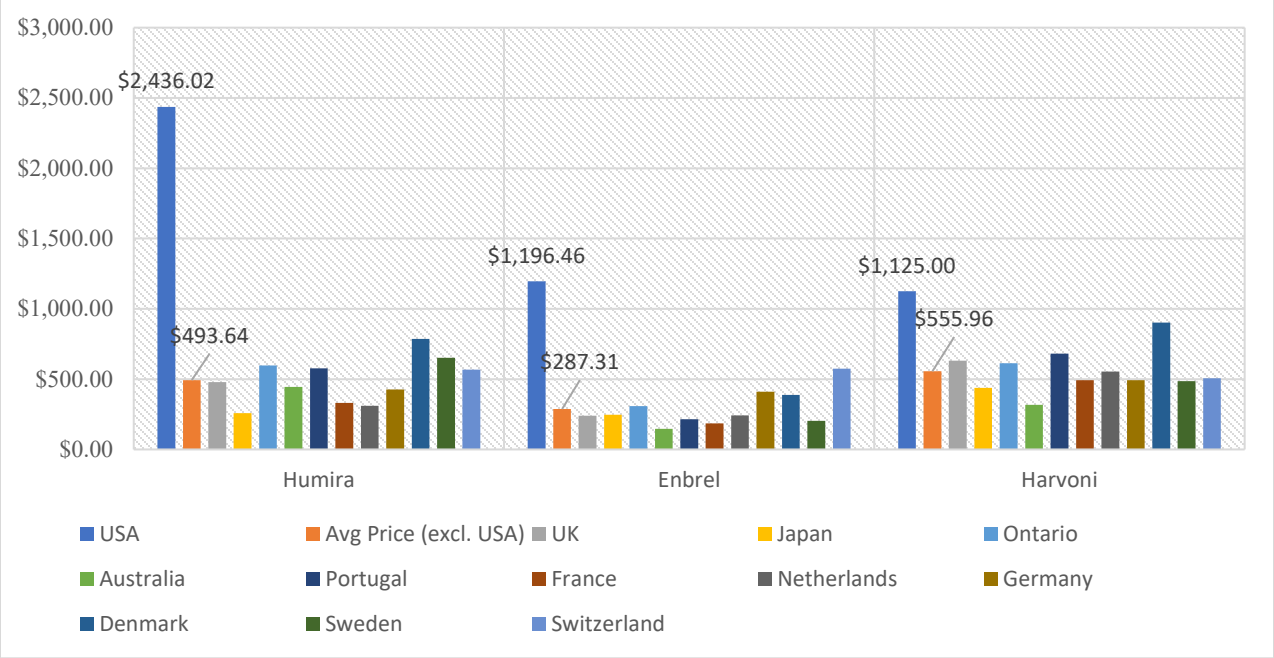
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources.*

Figure 13. Range of Pharmaceutical List Prices, 2018



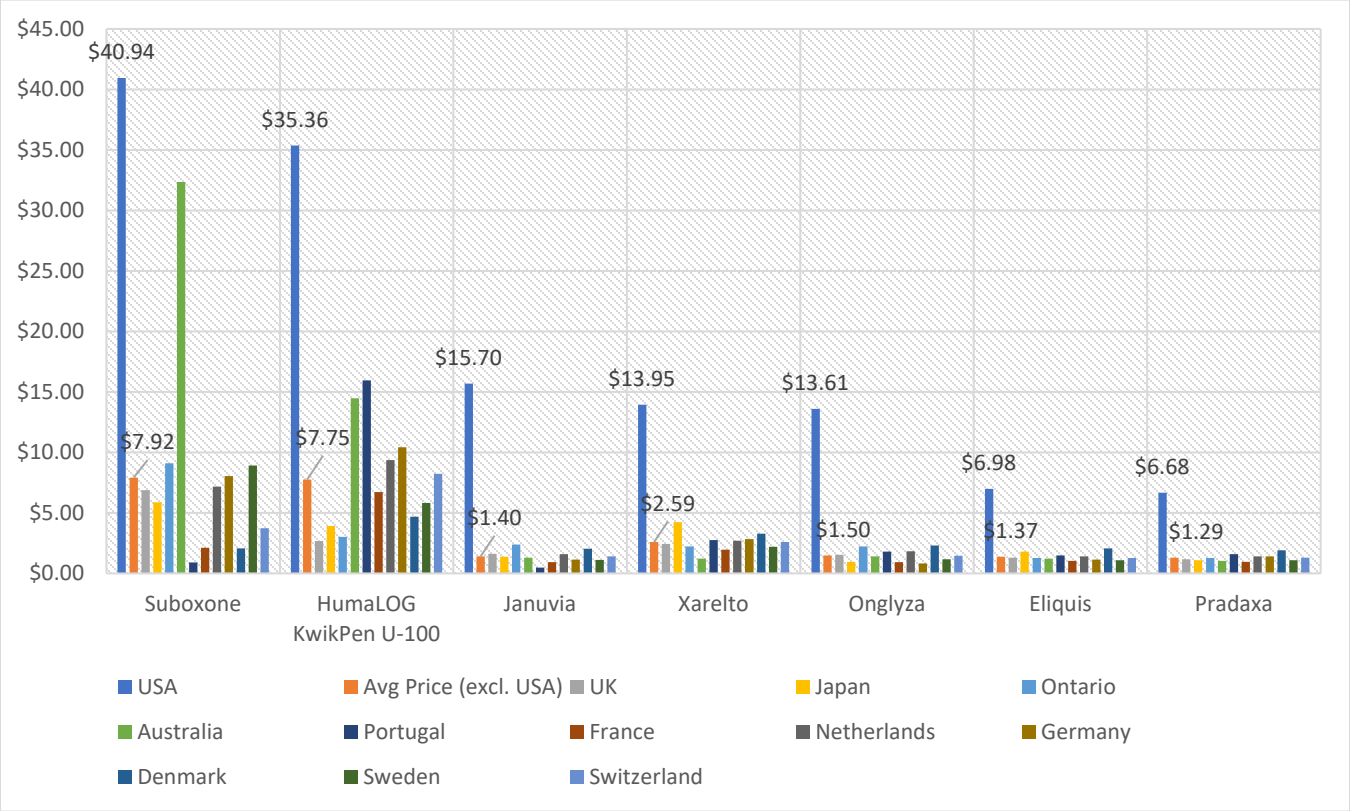
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources.*

Figure 14. Drug List Prices for Medications in All 12 Countries, 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. There were 10 drugs whose prices were listed in recognized drug price databases for all 12 countries studied. We chose to compare these drugs separately in Figures 14 and 14.B to cross-compare their drug prices in each country.*

Figure 14.B. Drug List Prices for Medications in All 12 Countries, 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. There were 10 drugs whose prices were listed in recognized drug price databases for all 12 countries studied. We chose to compare these drugs separately in Figures 14 and 14.B to cross-compare their drug prices in each country.*

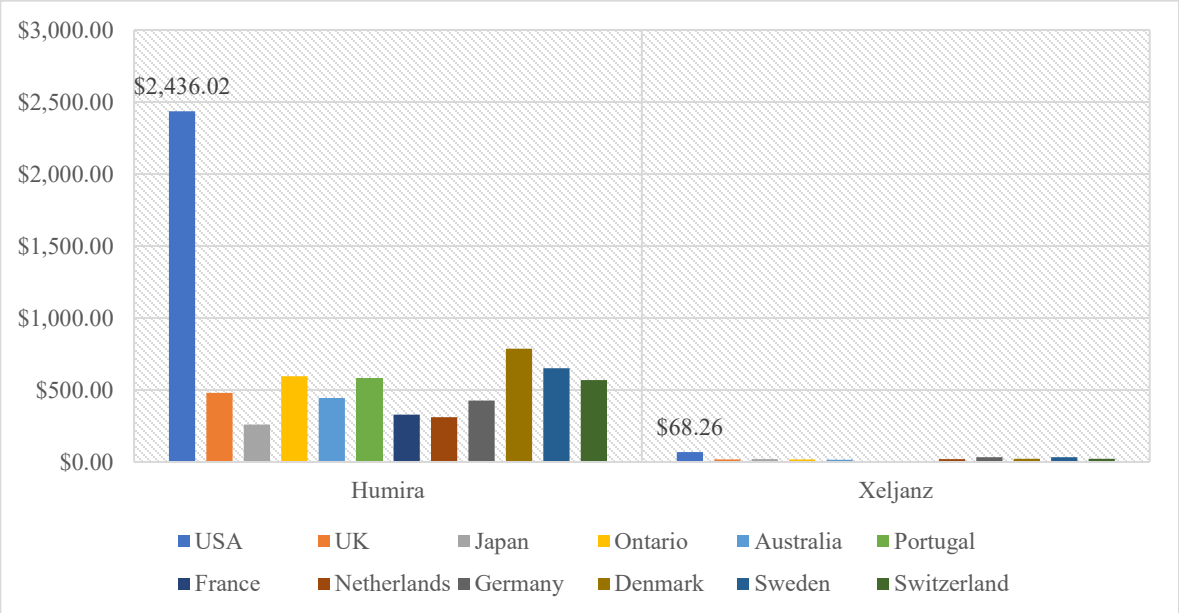
Appendix E: International List Price Comparison – Disease Groups

Table 7. Select Arthritis Medication List Prices, 2018

Arthritis Medication		
	Humira	**Xeljanz**
U.S.	$2,436.02	$68.26
UK	$479.10	$16.76
Japan	$259.05	$20.94
Ontario	$596.41	$18.56
Australia	$444.36	$15.85
Portugal	$577.62	-
France	$329.94	$4.67
Netherlands	$310.32	$19.12
Germany	$427.34	$34.36
Denmark	$787.10	$21.09
Sweden	$650.98	$32.71
Switzerland	$567.81	$23.02

SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Xeljanz were not available for Portugal.*

Figure 15. Select Arthritis Medication List Prices, 2018



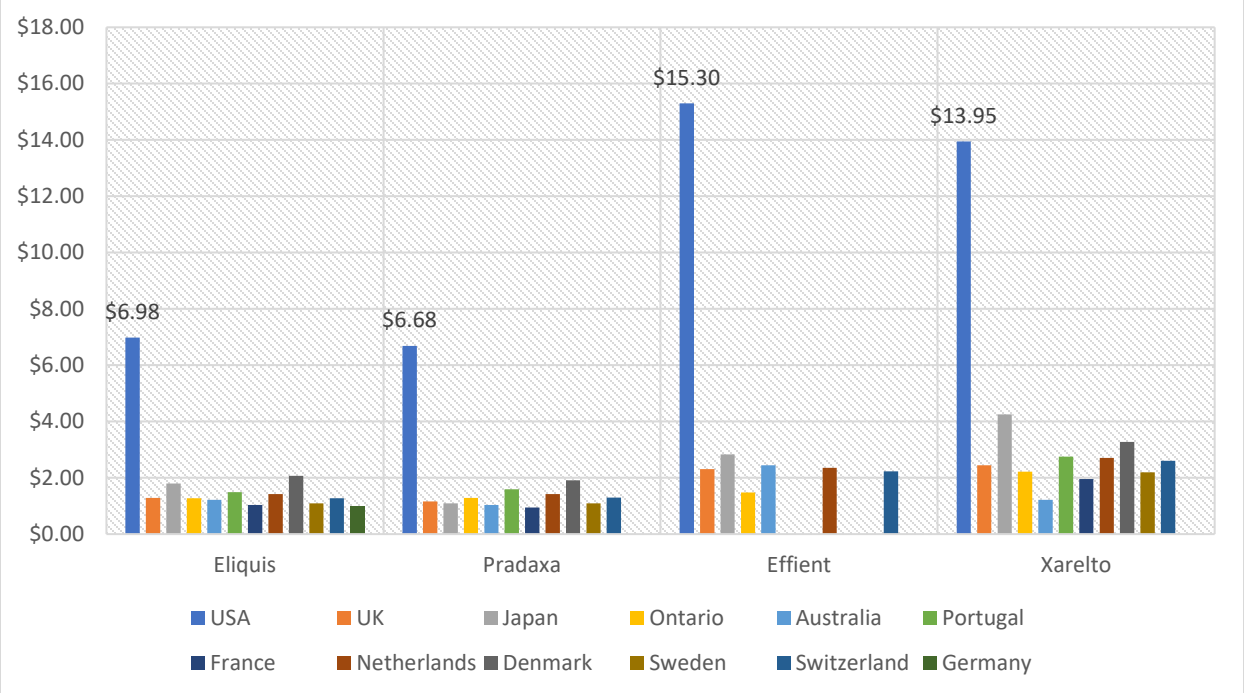
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Xeljanz were not available for Portugal.*

Table 8. Blood Thinning Medication List Prices, 2018

Blood Thinning Medication				
	Eliquis	**Pradaxa**	**Effient**	**Xarelto**
U.S.	$6.98	$6.68	$15.30	$13.95
UK	$1.29	$1.16	$2.31	$2.45
Japan	$1.80	$1.09	$2.83	$4.25
Ontario	$1.27	$1.28	$1.48	$2.22
Australia	$1.22	$1.03	$2.44	$1.22
Portugal	$1.49	$1.60	-	$2.75
France	$1.04	$0.95	-	$1.96
Netherlands	$1.42	$1.42	$2.36	$2.71
Germany	$1.14	$1.41	$2.52	$2.83
Denmark	$2.07	$1.91	-	$3.28
Sweden	$1.09	$1.09	-	$2.19
Switzerland	$1.28	$1.30	$2.22	$2.61

SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Effient were not available in Portugal, France, Denmark, or Sweden.*

Figure 16. Blood Thinning Medication List Prices, 2018



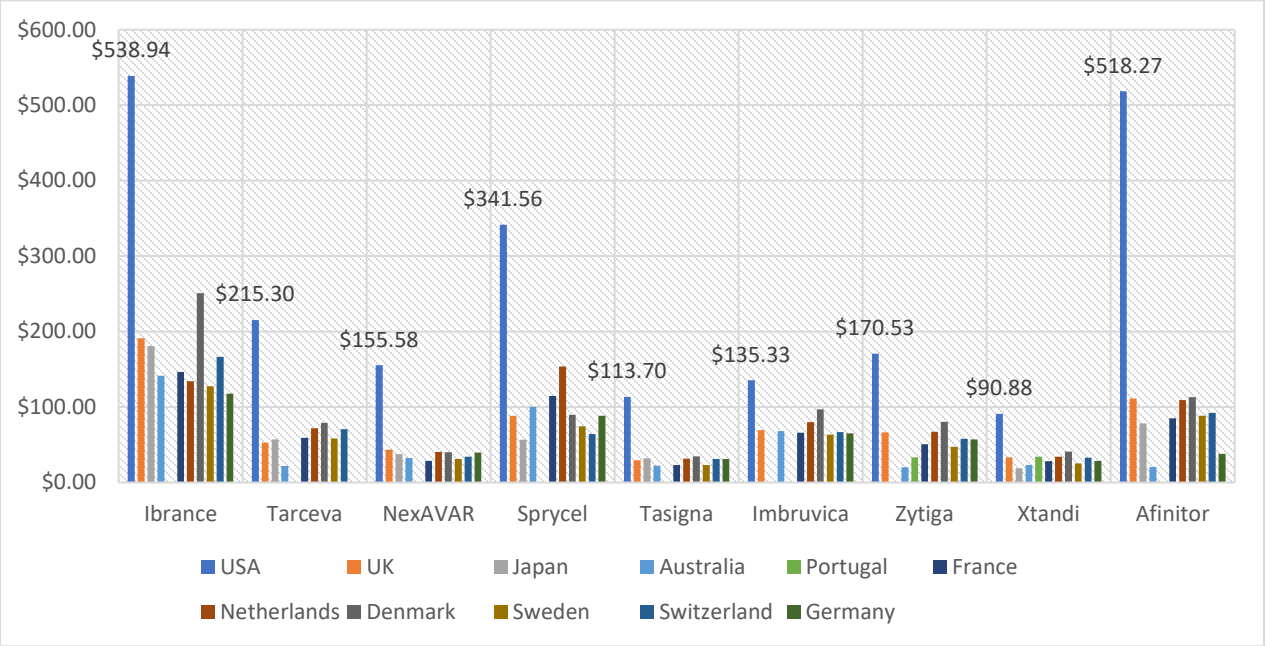
SOURCES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Effient were not available in Portugal, France, Denmark, or Sweden.*

Table 9. Select Cancer Medication List Prices, 2018

	Cancer Medication								
	Ibrance	**Tarceva**	**NexAVAR**	**Sprycel**	**Tasigna**	**Imbruvica**	**Zytiga**	**Xtandi**	**Afinitor**
U.S.	$538.94	$215.30	$155.58	$341.56	$113.70	$135.33	$170.53	$90.88	$518.27
UK	$191.12	$53.05	$43.45	$88.38	$29.55	$69.52	$66.45	$33.22	$111.34
Japan	$180.90	$56.94	$37.50	$56.76	$31.97	-	-	$18.88	$78.42
Ontario	-	-	-	-	-	-	-	-	-
Australia	$141.30	$21.90	$32.36	$100.43	$22.43	$68.32	$20.02	$23.15	$20.80
Portugal	-	-	-	-	-	-	$33.32	$34.14	-
France	$146.43	$59.03	$28.84	$114.59	$22.99	$66.16	$50.80	$28.46	$85.23
Netherlands	$134.24	$72.02	$40.58	$153.95	$31.59	$79.95	$67.18	$34.28	$109.24
Germany	$117.84	-	$39.65	$88.61	$31.35	$64.99	$56.98	$28.49	$37.88
Denmark	$250.70	$78.95	$40.34	$89.69	$34.51	$96.93	$80.36	$41.06	$113.25
Sweden	$127.38	$58.51	$31.07	$74.34	$23.20	$63.33	$47.17	$25.09	$88.63
Switzerland	$166.50	$70.76	$34.17	$64.27	$31.35	$66.65	$57.77	$33.13	$92.50

SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on any of the cancer medications examined were not available for Ontario, Canada. Data on Ibrance, Tarceva, NexAVAR, Sprycel, Tasigna, Imbruvica, or Afinitor were not available in Portugal. Data on Imbruvica and Zytiga were not available in Japan.*

Figure 17. Select Cancer Medication List Prices, 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on any of the cancer medications examined were not available for Ontario, Canada. Data on Ibrance, Tarceva, NexAVAR, Sprycel, Tasigna, Imbruvica, or Afinitor were not available in Portugal. Data on Imbruvica and Zytiga were not available in Japan.*

Table 10 Insulin Medication List Prices, 2018

Insulin Medication						
	Toujeo Solostar	**NovoLOG Flexpen**	**NovoLOG**	**HumaLOG KwikPen U-100**	**HumaLOG Mix 75-25 KwikPen**	**Levemir Flextouch**
U.S.	$82.74	$37.26	$36.55	$35.36	$35.36	$29.38
UK	$10.02	$2.78	$2.74	$2.67	$2.81	$3.81
Japan	-	-	-	$3.93	$3.99	-
Ontario	-	$3.26	$2.79	$3.02	$3.05	$5.62
Australia	$33.64	$14.46	$14.46	$14.46	$14.46	$48.70
Portugal	$11.16	$9.75	$23.56	$15.94	-	$13.96
France	$12.06	$6.73	$5.71	$6.73	$6.73	$9.66
Netherlands	$17.12	$4.54	-	$9.36	$8.03	$13.17
Denmark	$13.55	$4.73	$4.17	$4.68	$4.68	$5.34
Sweden	$13.03	$6.10	$6.96	$5.84	$5.78	$10.67
Switzerland	$18.50	$9.77	$9.15	$8.23	$7.53	-

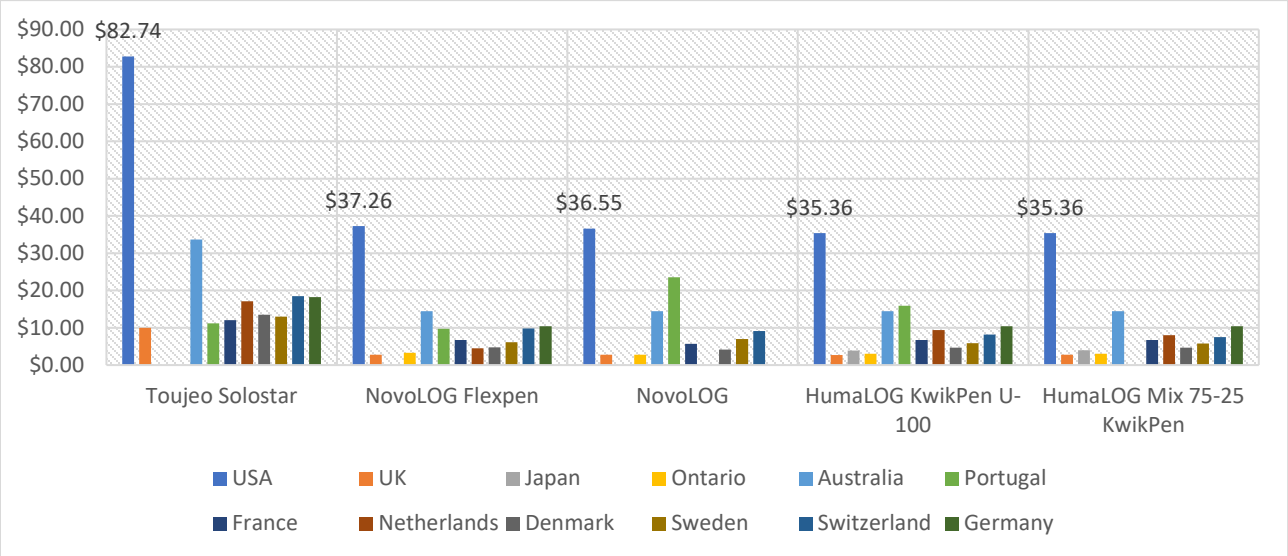
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Toujeo Solostar, NovoLOG Flexpen, NovoLOG, and Levemir Flextouch were not available in Japan. Data on Toujeo Solostar were not available in Ontario, Canada. Data on HumaLOG Mix 75-25 KwikPen were not available in Portugal. Data on NovoLOG were not available in the Netherlands. Data on Levemir Flextouch were not available in Switzerland.*

Table 10.B. Insulin Medication List Prices, 2018

Insulin Medication				
	Levemir	**HumaLOG**	**Lantus**	**Lantus SoloStar**
U.S.	$29.38	$27.47	$26.96	$26.95
UK	$3.81	$2.26	$3.43	$26.95
Japan	-	$2.34	-	$3.43
Ontario	$5.62	$2.30	$4.78	$5.17
Australia	$48.70	$8.70	$33.64	$16.82
Portugal	$13.96	$2.59	$45.45	$45.45
France	$9.66	$5.71	$8.78	$8.78
Netherlands	$12.91	$8.03	$11.11	$11.21
Denmark	$5.34	$4.01	$5.26	$5.26
Sweden	$11.54	$25.43	$0.00	$26.70
Switzerland	$14.11	$8.23	$10.36	$8.81

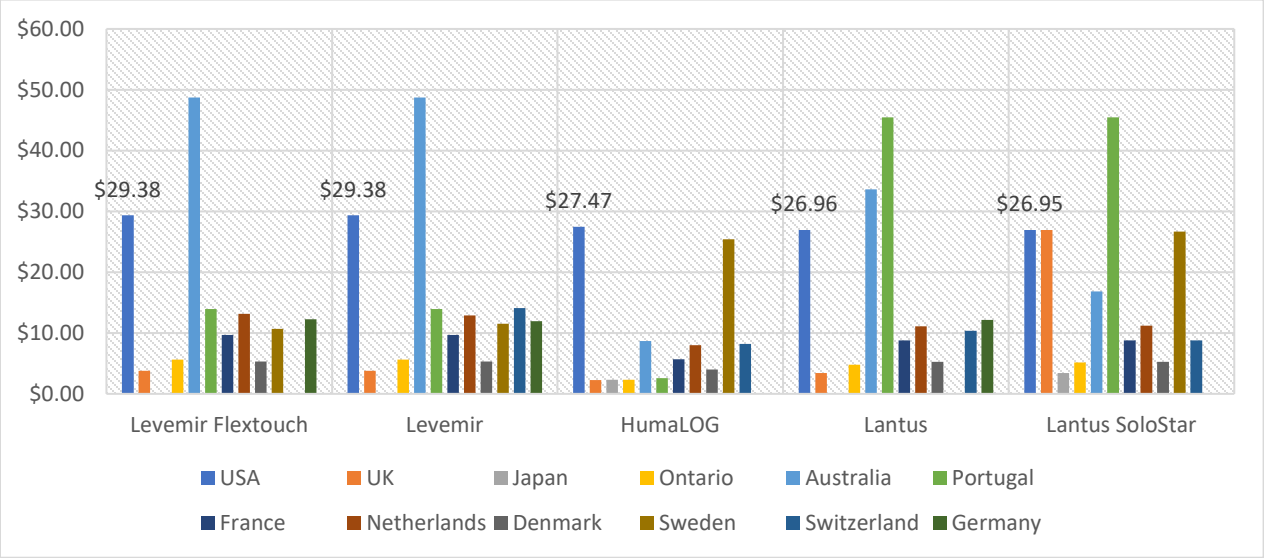
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Levemir or Lantus were not available for Japan.*

Figure 18. Insulin Medication List Prices, 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Toujeo Solostar, NovoLOG Flexpen, NovoLOG, and Levemir Flextouch were not available in Japan. Data on Toujeo Solostar were not available in Ontario, Canada. Data on HumaLOG Mix 75-25 KwikPen were not available in Portugal. Data on NovoLOG were not available in the Netherlands. Data on Levemir Flextouch were not available in Switzerland. Data on Levemir or Lantus were not available for Japan. We chose to compare these drugs separately in Figures 18 and 18.B to cross-compare their drug prices in each country.*

Figure 18.B. Insulin Medication List Prices, 2018



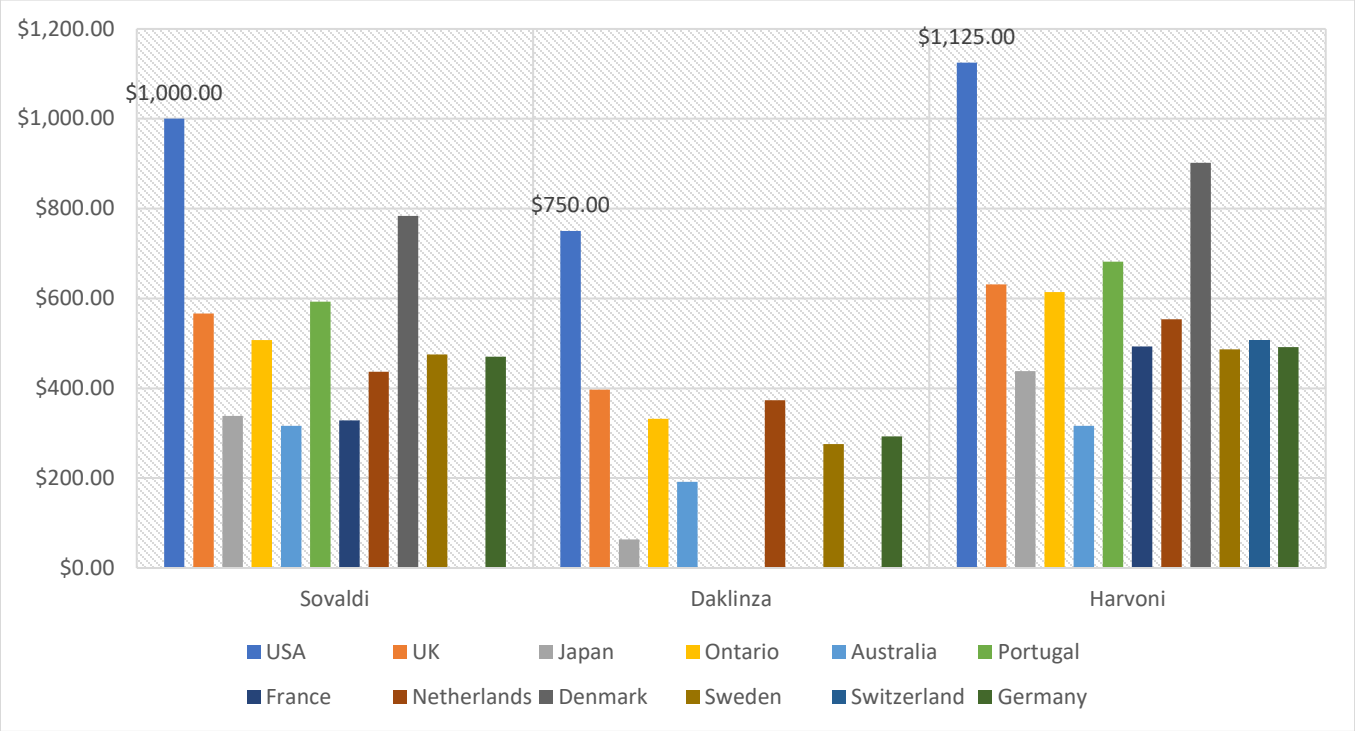
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Toujeo Solostar, NovoLOG Flexpen, NovoLOG, and Levemir Flextouch were not available in Japan. Data on Toujeo Solostar were not available in Ontario, Canada. Data on HumaLOG Mix 75-25 KwikPen were not available in Portugal. Data on NovoLOG were not available in the Netherlands. Data on Levemir Flextouch were not available in Switzerland. Data on Levemir or Lantus were not available for Japan. We chose to compare these drugs separately in Figures 18 and 18.B to cross-compare their drug prices in each country.*

Table 11. Hepatitis C Medication List Prices, 2018

Hepatitis C Medication			
	Sovaldi	**Daklinza**	**Harvoni**
U.S.	$1,000.00	$750.00	$1,125.00
UK	$566.62	$397.11	$631.36
Japan	$338.69	$63.37	$438.51
Ontario	$507.17	$331.97	$613.96
Australia	$316.28	$191.67	$316.28
Portugal	$592.76	-	$682.02
France	$328.57	-	$492.86
Netherlands	$436.49	$373.11	$553.96
Germany	$470.56	$293.26	$491.83
Denmark	$783.84	-	$902.10
Sweden	$475.05	$275.78	$486.44
Switzerland	-	-	$506.24

SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Sovaldi were not available for Switzerland. Data on Daklinza were not available for Portugal, France, Denmark, or Switzerland.*

Figure 19. Hepatitis C Medication List Prices, 2018



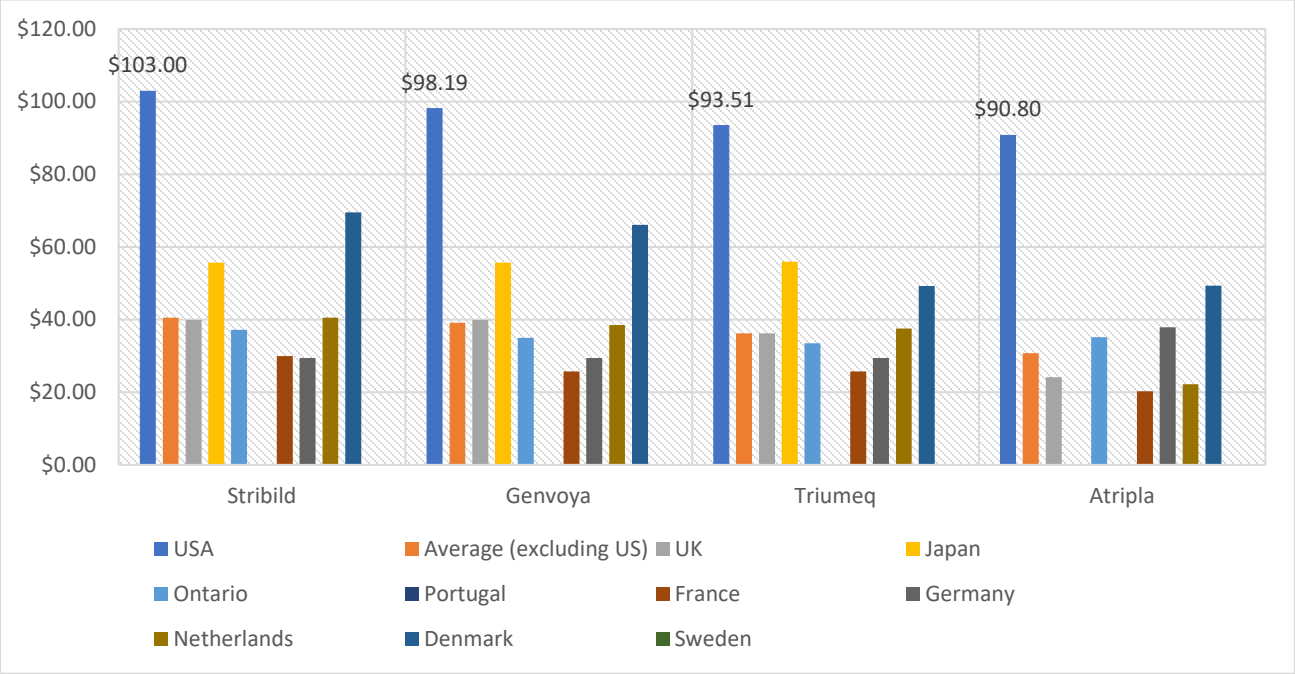
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Sovaldi were not available for Switzerland. Data on Daklinza were not available for Portugal, France, Denmark, or Switzerland.*

Table 12. HIV Medication List Prices, 2018

HIV Medication								
	Stribild	**Genvoya**	**Triumeq**	**Atripla**	**Tivicay**	**Prezista**	**Isentress**	**Reyataz**
U.S.	$103.00	$98.19	$93.51	$90.80	$55.25	$39.99	$24.92	$7.93
UK	$39.89	$39.89	$36.20	$24.17	$22.62	$11.87	$10.66	$3.55
Japan	$55.67	$55.67	$55.91	-	$26.05	$11.30	$12.46	-
Ontario	$37.19	$34.97	$33.46	$35.10	$15.10	$14.98	$10.87	$3.57
Australia	$20.82	$22.91	$20.83	$19.94	$15.30	$14.50	$3.46	$8.21
Portugal	-	-	-	-	-	-	-	-
France	$29.94	$25.72	$25.72	$20.21	$18.37	$11.04	$2.53	$6.90
Germany	$29.38	$29.38	$29.38	$37.88	$21.28	$25.68	$13.00	$12.74
Netherlands	$40.51	$38.48	$37.56	$22.23	$24.34	$12.81	$12.35	$9.18
Denmark	$69.51	$66.05	$49.26	$49.34	$28.34	$18.81	$16.56	$11.25
Sweden	-	-	-	-	-	$7.63	$9.84	$7.30
Switzerland	$41.79	$39.10	$37.75	$36.79	$23.08	$19.97	$12.37	$11.54

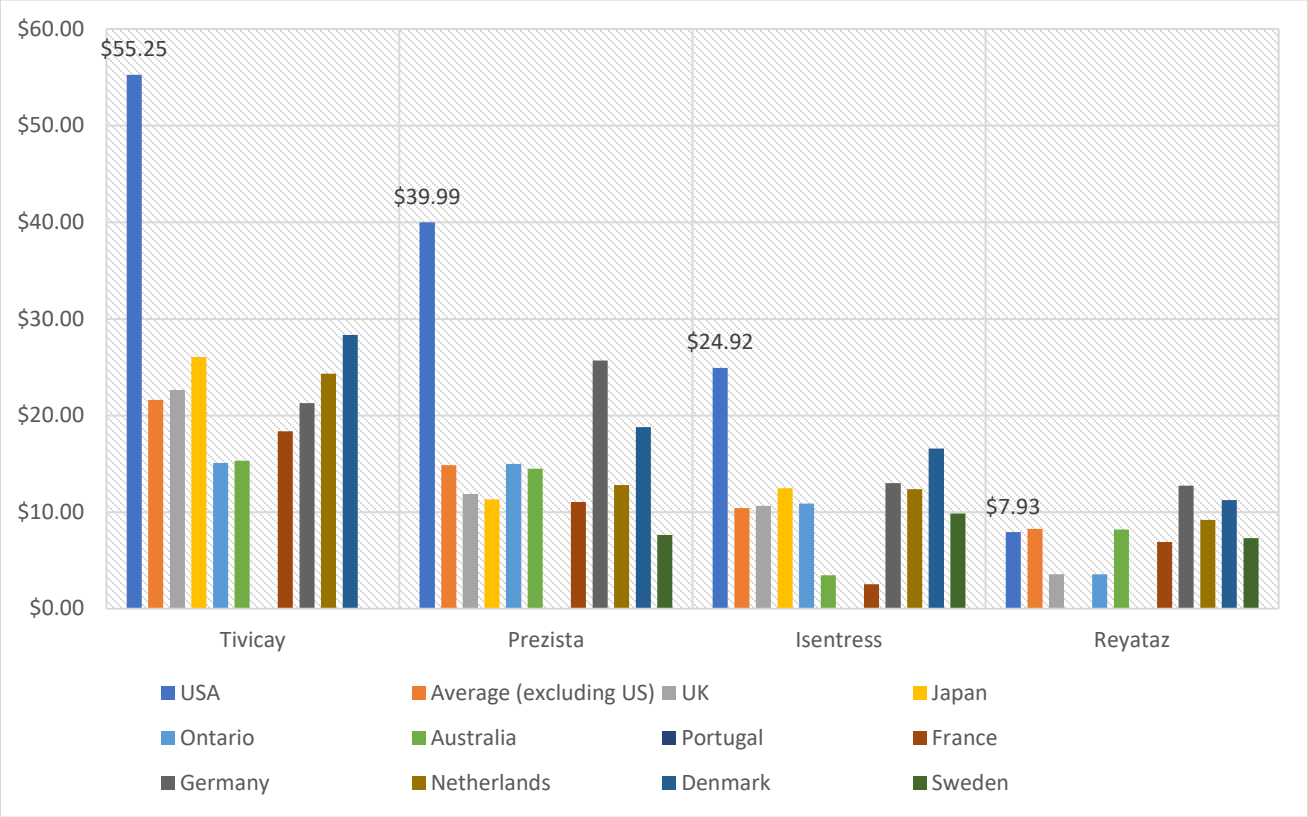
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on any of the HIV medications studied were not available for Portugal. Data on Atripla and Reyataz were not available for Japan. Data on Stribild, Genvoya, Triumeq, Atripla, and Tivicay were not available for Sweden.*

Figure 20. HIV Medication List Prices, 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on any of the HIV medications studied were not available for Portugal. Data on Atripla were not available for Japan. Data on Stribild, Genvoya, Triumeq, and Atripla, were not available for Sweden. We chose to compare these drugs separately in Figures 20 and 20.B to cross-compare their drug prices in each country.*

Figure 20.B. HIV Medication List Prices, 2018



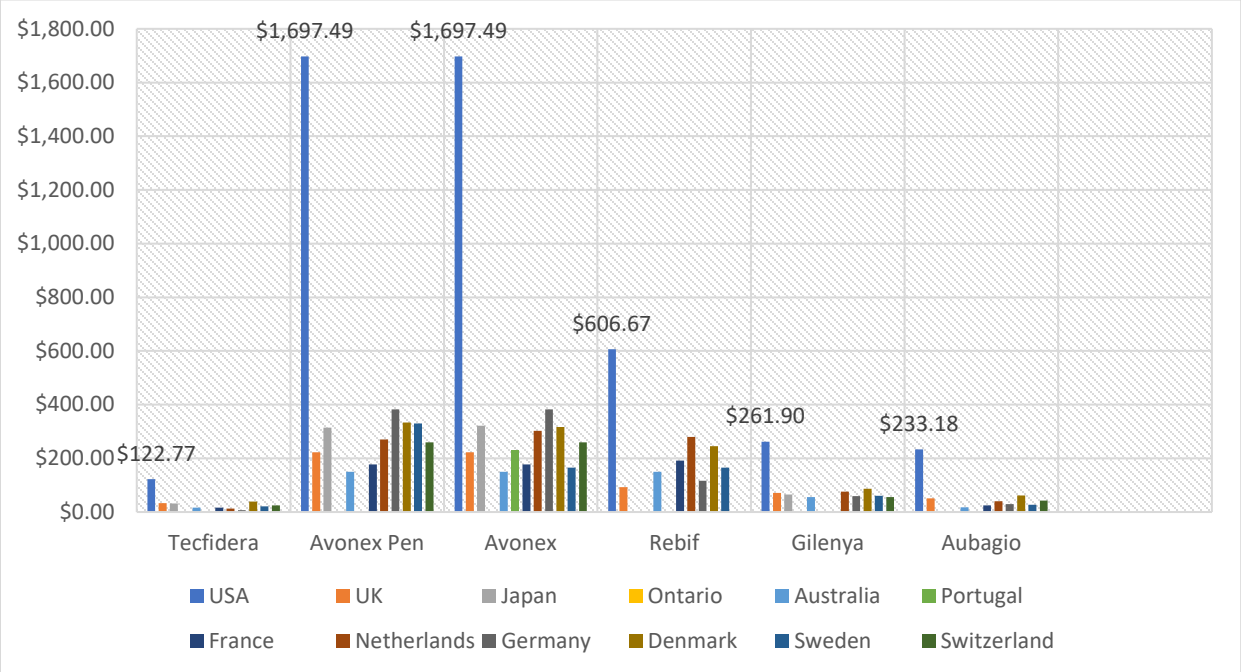
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on any of the HIV medications studied were not available for Portugal. Data on Reyataz were not available for Japan. Data on Tivicay were not available for Sweden. We chose to compare these drugs separately in Figures 20 and 20.B to cross-compare their drug prices in each country.*

Table 13. Multiple Sclerosis Medication List Prices, 2018

Multiple Sclerosis Medication						
	Tecfidera	**Avonex Pen**	**Avonex**	**Rebif**	**Gilenya**	**Aubagio**
U.S.	$122.77	$1,697.49	$1,697.49	$606.67	$261.90	$233.18
UK	$33.33	$222.45	$222.45	$92.12	$71.43	$50.43
Japan	$32.40	$313.96	$321.37	-	$65.34	
Ontario			-	-		
Australia	$16.10	$149.57	$149.57	$149.57	$55.23	$17.62
Portugal	-	-	$230.03	-	-	-
France	$16.24	$177.10	$177.10	$191.25	-	$25.29
Netherlands	$12.76	$270.03	$302.24	$279.84	$75.91	$40.57
Germany	$7.38	$382.19	$382.19	$116.41	$58.76	$29.54
Denmark	$38.92	$333.25	$317.41	$245.20	$86.74	$61.82
Sweden	$21.13	$329.91	$164.95	$164.96	$60.83	$27.18
Switzerland	$25.20	$260.06	$260.06	-	$55.99	$43.04

SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Rebif and Aubagio were not available for Japan. Data on Tecfidera, Avonex Pen, Avonex, Rebif, Gilenya, and Aubagio were not available for Ontario, Canada. Data on Tecfidera, Avonex Pen, Rebif, Gilenya, and Aubagio were not available for Portugal. Data on Gilenya were not available for France.*

Figure 21 Multiple Sclerosis Medication List Prices, 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Rebif and Aubagio were not available for Japan. Data on Tecfidera, Avonex Pen, Avonex, Rebif, Gilenya, and Aubagio were not available for Ontario, Canada. Data on Tecfidera, Avonex Pen, Rebif, Gilenya, and Aubagio were not available for Portugal. Data on Gilenya were not available for France.*

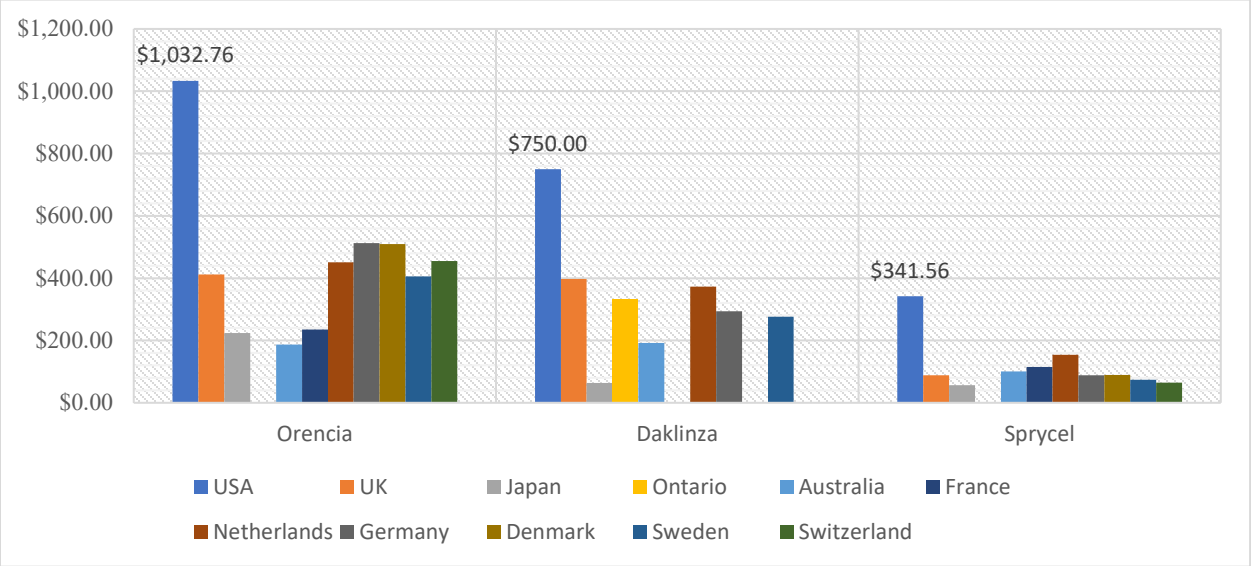
Appendix F: International List Price Comparison – Manufacturers

Table 14. List Prices of Drugs Manufactured by Bristol-Myers Squibb Company, 2018

Bristol-Myers Squibb Company Drugs					
	Orencia	**Daklinza**	**Sprycel**	**Reyataz**	**Eliquis**
U.S.	$1,032.76	$750.00	$341.56	$7.93	$6.98
UK	$411.43	$397.11	$88.38	$3.55	$1.29
Japan	$224.10	$63.37	$56.76	-	$1.80
Ontario	-	$331.97	-	$3.57	$1.27
Australia	$186.44	$191.67	$100.43	$8.21	$1.22
Portugal	-	-	-	-	$1.49
France	$235.29	-	$114.59	$6.90	$1.04
Netherlands	$450.38	$373.11	$153.95	$9.18	$1.42
Germany	$512.44	$293.26	$88.61	$12.74	$1.14
Denmark	$509.00	-	$89.69	$11.25	$2.07
Sweden	$405.79	$275.78	$74.34	$7.30	$1.09
Switzerland	$454.78	-	$64.27	$11.54	$1.28

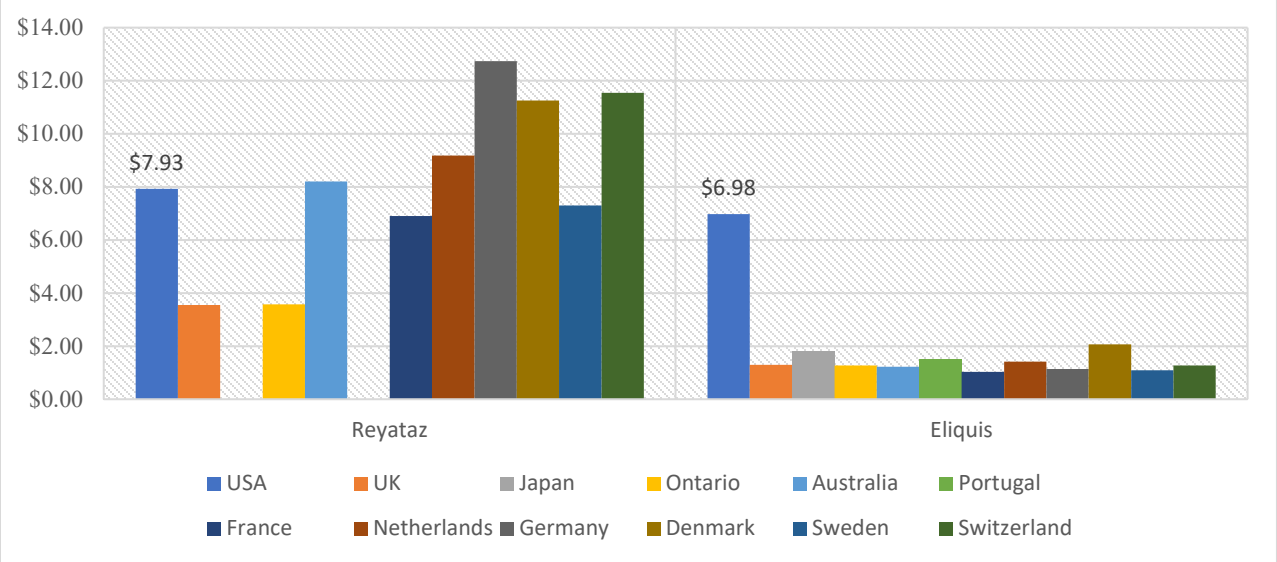
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Orencia were not available for Ontario, or Portugal. Data on Daklinza were not available for Portugal, France, Denmark, and Switzerland. Data on Sprycel were not available for Ontario, or Portugal. Data on Reyataz were not available for Japan or Portugal. Information on Bristol-Myers Squibb Company-manufactured pharmaceuticals provided by "Our Medicines" database on the Bristol-Myers Squibb Company website.*

Figure 22. List Prices of Drugs Manufactured by Bristol-Myers Squibb Company, 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Orencia were not available for Ontario, or Portugal. Data on Daklinza were not available for Portugal, France, Denmark, or Switzerland. Data on Sprycel were not available for Ontario, or Portugal. We chose to compare these drugs separately in Figures 22 and 22.B to cross-compare their drug prices in each country. Information on Bristol-Myers Squibb Company-manufactured pharmaceuticals provided by "Our Medicines" database on the Bristol-Myers Squibb Company website.*

Figure 22.B. List Prices of Drugs Manufactured by Bristol-Myers Squibb Company, 2018



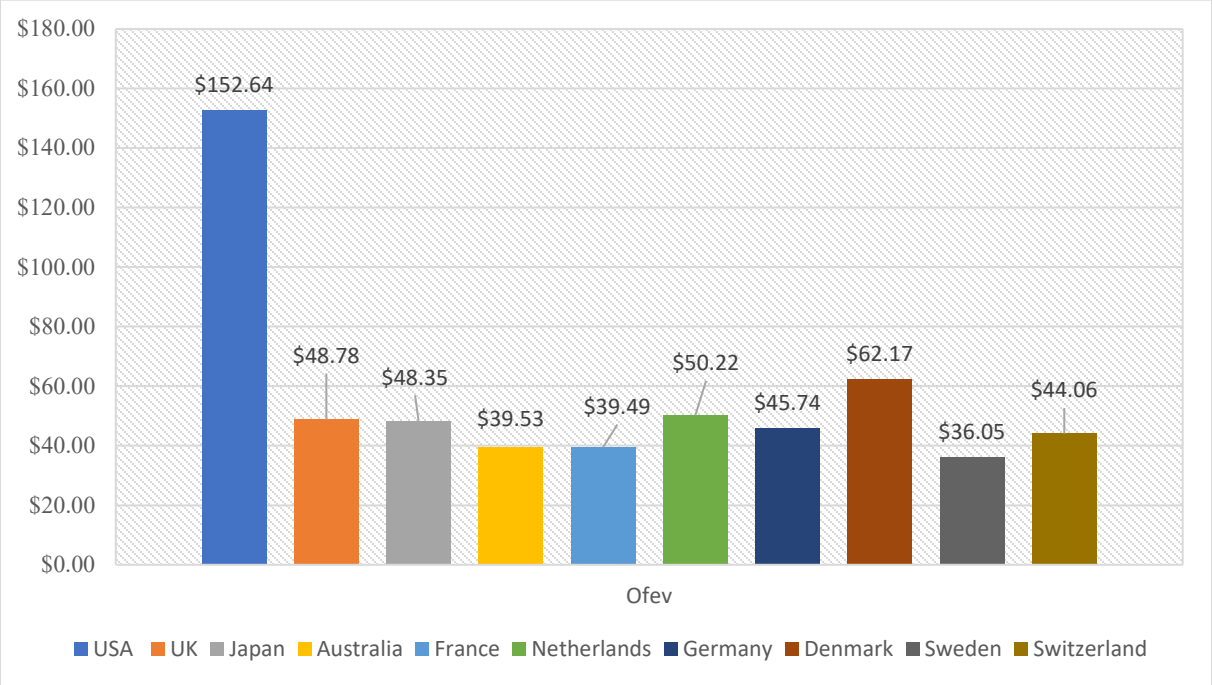
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Reyataz were not available for Japan or Portugal. We chose to compare these drugs separately in Figures 22 and 22.B to cross-compare their drug prices in each country. Information on Bristol-Myers Squibb Company-manufactured pharmaceuticals provided by "Our Medicines" database on the Bristol-Myers Squibb Company website.*

Table 15. List Prices of Drugs Manufactured by Boehringer Ing., 2018

Boehringer Ing. Drugs				
	Ofev	**Tradjenta**	**Spiriva Respimat**	**Pradaxa**
U.S.	$152.64	$13.72	$13.26	$6.68
UK	$48.78	$1.62	$1.58	$1.16
Japan	$48.35	$1.25	$1.55	$1.09
Ontario	-	$1.98	$1.34	$1.28
Australia	$39.53	$1.40	$2.19	$1.03
Portugal	-	$2.04	$1.40	$1.60
France	$39.49	-	$0.42	$0.95
Netherlands	$50.22	$1.67	-	$1.42
Germany	$45.74	-	$50.13	$1.41
Denmark	$62.17	-	$1.50	$1.91
Sweden	$36.05	$1.12	$0.54	$1.09
Switzerland	$44.06	$1.46	$0.69	$1.30

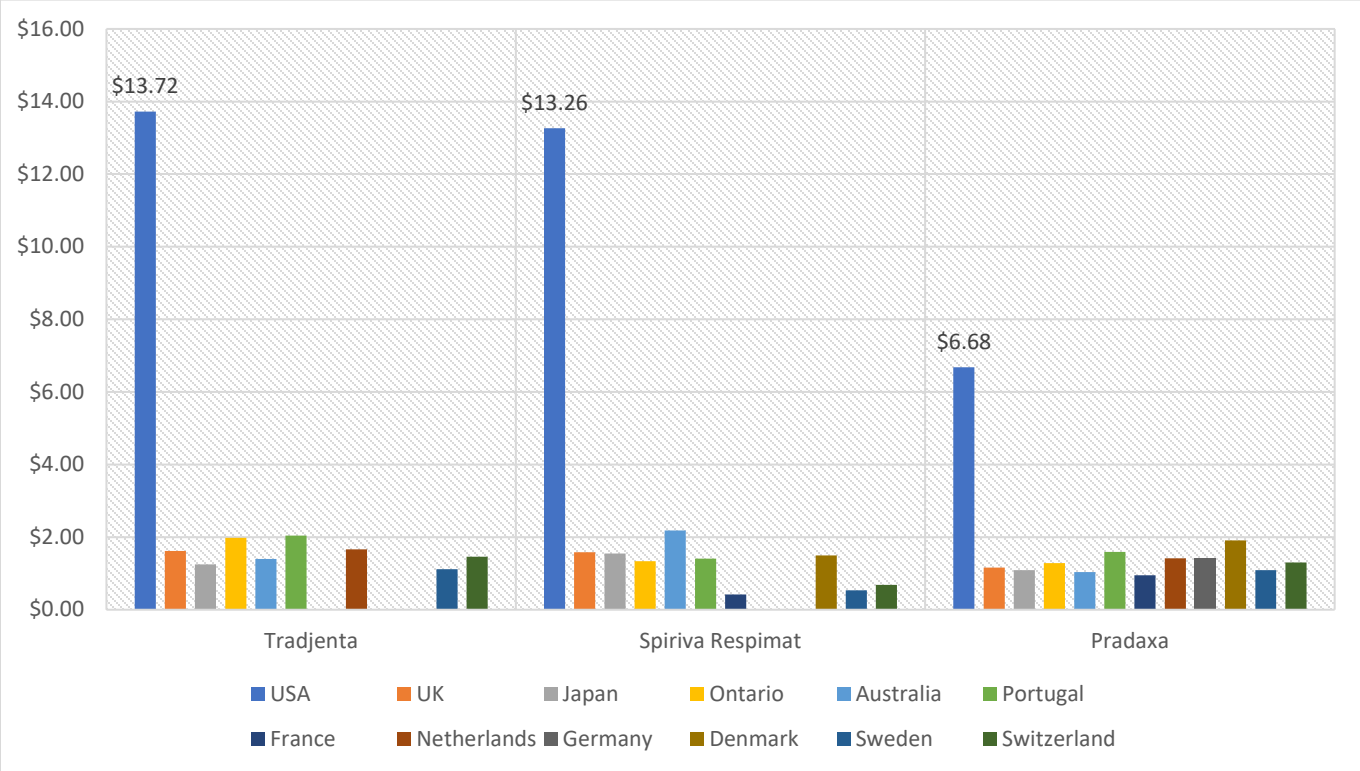
SOURCES and NOTES: *Authors' analysis of price data for 2018 collected from recognized price sources. Data on Ofev were not available for Ontario or Portugal. Data on Tradjenta were not available for France, Germany, or Denmark. Data on Spriva Respimat were not available for the Netherlands.*

Figure 23. List Prices of Drugs Manufactured by Boehringer Ing., 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Ofev were not available for Ontario or Portugal. We chose to compare these drugs separately in Figures 23 and 23.B to cross-compare their drug prices in each country.*

Figure 23.B. List Prices of Drugs Manufactured by Boehringer Ing., 2018



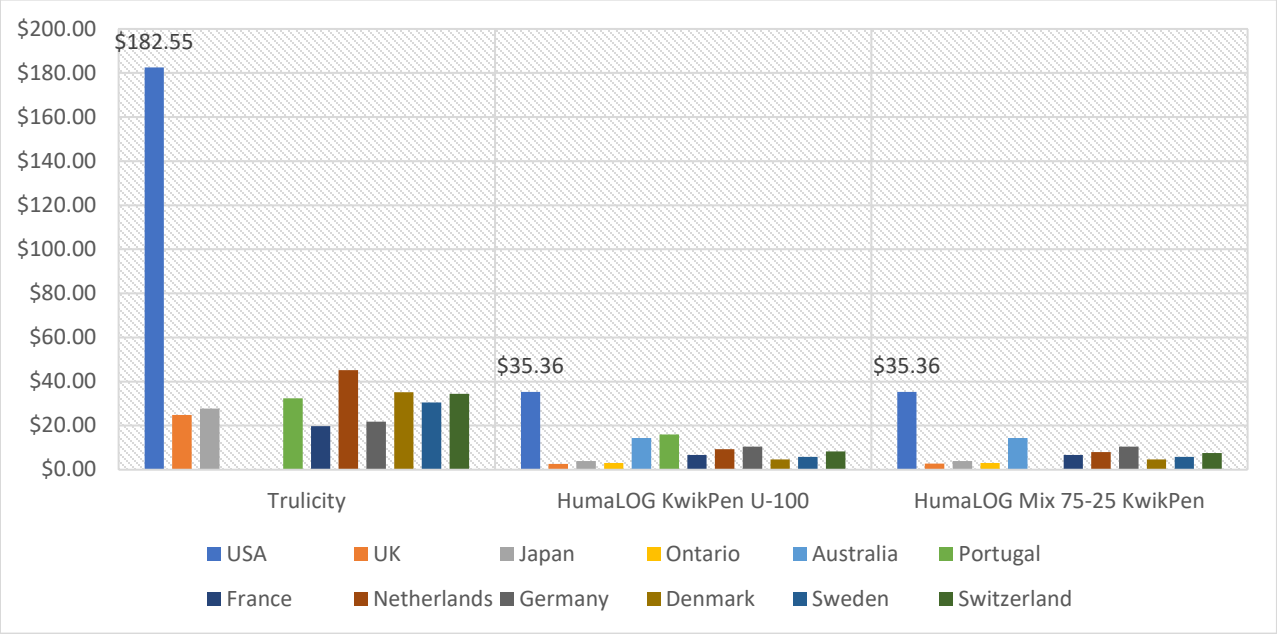
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Tradjenta were not available for France, Germany, or Denmark. Data on Spriva Respimat were not available for the Netherlands. We chose to compare these drugs separately in Figures 23 and 23.B to cross-compare their drug prices in each country.*

Table 16. List Prices of Drugs Manufactured by Eli Lily & Co., 2018

Eli Lily & Co. Drugs							
	Forteo	**Trulicity**	**HumaLOG KwikPen U-100**	**HumaLOG Mix 75-25 KwikPen**	**HumaLOG**	**Effient**	**HumuLIN 70-30**
U.S.	$1,372.79	$182.55	$35.36	$35.36	$27.47	$15.30	$14.87
UK	$154.13	$24.91	$2.67	$2.81	$2.26	$2.31	$1.97
Japan	$144.78	$27.76	$3.93	$3.99	$2.34	$2.83	$4.42
Ontario	-	-	$3.02	$3.05	$2.30	$1.48	$2.50
Australia	$288.43	-	$14.46	$14.46	$8.70	$2.44	$4.86
Portugal	$401.14	$32.39	$15.94	-	$2.59	-	-
France	-	$19.80	$6.73	$6.73	$5.71	-	-
Netherlands	$438.73	$45.22	$9.36	$8.03	$8.03	$2.36	$6.53
Germany	$552.97	$21.85	$10.43	$10.43	-	$2.52	$7.03
Denmark	$518.23	$35.18	$4.68	$4.68	$4.01	-	$2.43
Sweden	$367.24	$30.45	$5.84	$5.78	$25.43	-	$10.48
Switzerland	$383.12	$34.50	$8.23	$7.53	$8.23	$2.22	$8.05

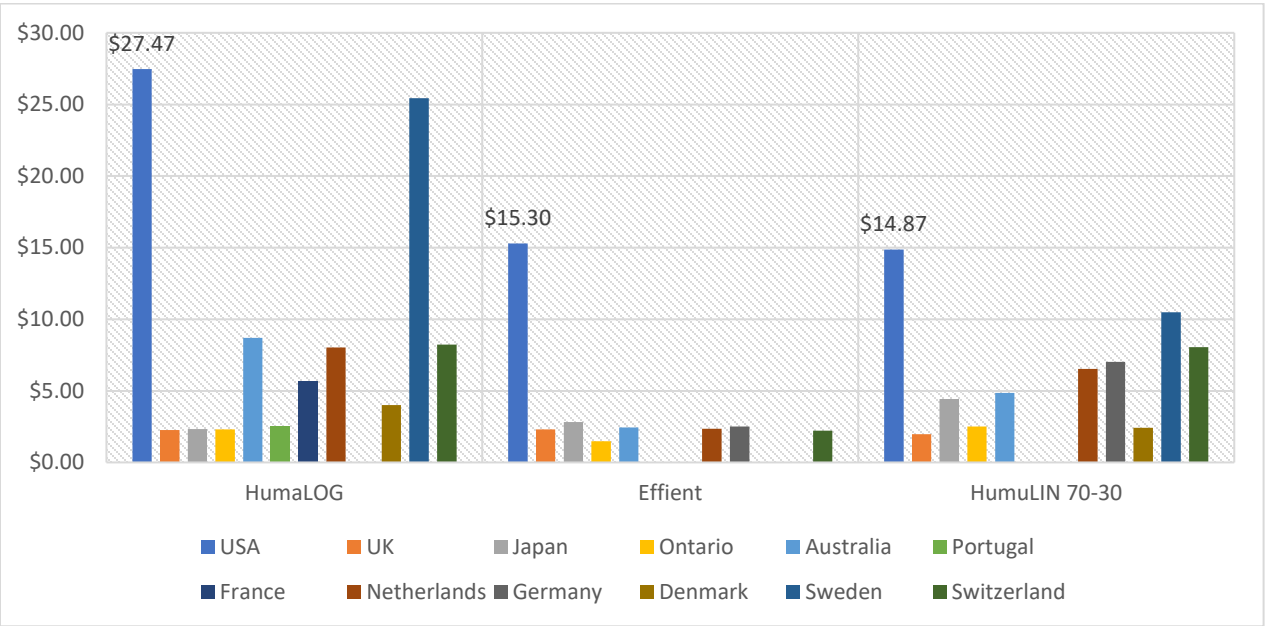
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Forteo were not available for Ontario, Canada and France. Data on Trulicity were not available for Ontario or Australia. Data on HumaLOG Mix 75-25 Kwikpen were not available for Portugal. Data on HumaLOG were not available for Germany. Data on Effient were not available in Portugal, France, Denmark, and Sweden. Data on HumuLIN 70-30 were not available in Portugal and France.*

Figure 24. List Prices of Drugs Manufactured by Eli Lily & Co., 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Trulicity were not available for Ontario or Australia. Data on HumaLOG Mix 75-25 Kwikpen were not available for Portugal. We chose to compare these drugs separately in Figures 24 and 24.B to cross-compare their drug prices in each country.*

Figure 24.B. List Prices of Drugs Manufactured by Eli Lily & Co., 2018



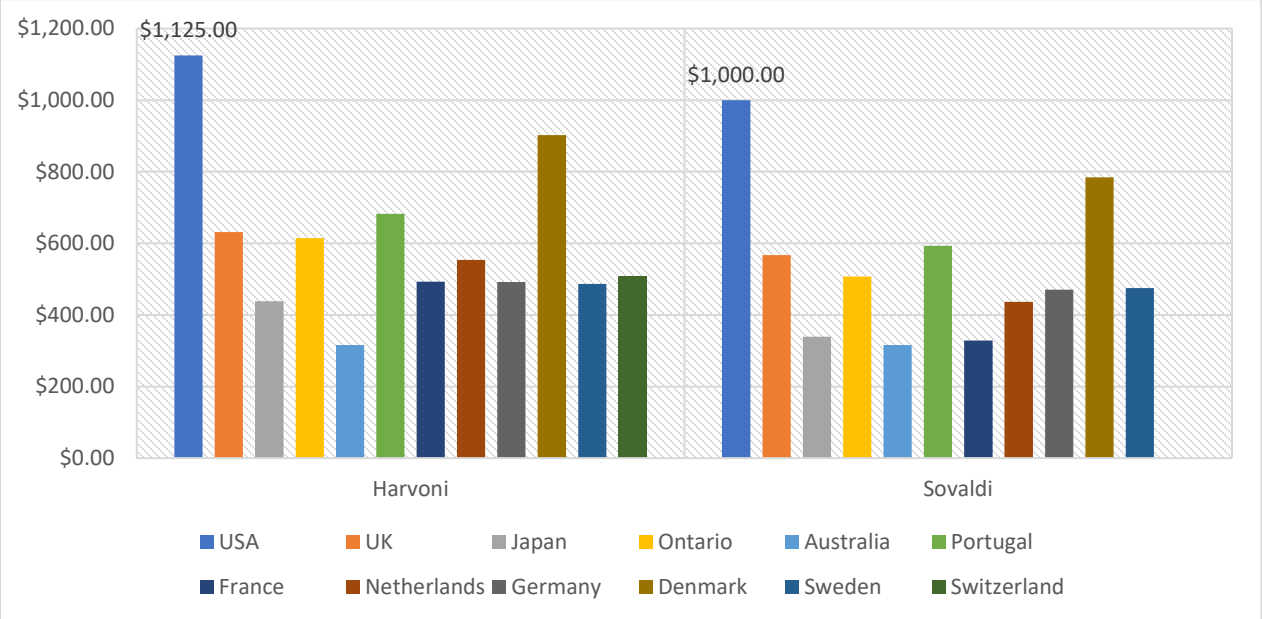
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on HumaLOG were not available for Germany. Data on Effient were not available in Portugal, France, Denmark, and Sweden. Data on HumuLIN 70-30 were not available in Portugal and France. We chose to compare these drugs separately in Figures 24 and 24.B to cross-compare their drug prices in each country.*

Table 17. List Prices of Drugs Manufactured by Gilead Sciences, 2018

Gilead Sciences Drugs						
	Harvoni	**Sovaldi**	**Letairis**	**Stribild**	**Genvoya**	**Ranexa**
U.S.	$1,125.00	$1,000.00	$308.48	$103.00	$98.19	$6.87
UK	$631.36	$566.62	$73.38	$39.89	$39.89	$0.84
Japan	$438.51	$338.69	-	$55.67	$55.67	-
Ontario	$613.96	$507.17	-	$37.19	$34.97	-
Australia	$316.28	$316.28	-	$20.82	$22.91	-
Portugal	$682.02	$592.76	-	-	-	$1.22
France	$492.86	$328.57	-	$29.94	$25.72	-
Netherlands	$553.96	$436.49	-	$40.51	$38.48	-
Germany	$491.83	$470.56	$37.88	$29.38	$29.38	$1.08
Denmark	$902.10	$783.84	$130.14	$69.51	$66.05	-
Sweden	$486.44	$475.05	-	-	-	-
Switzerland	$506.24	-	$105.51	$41.79	$39.10	$1.15

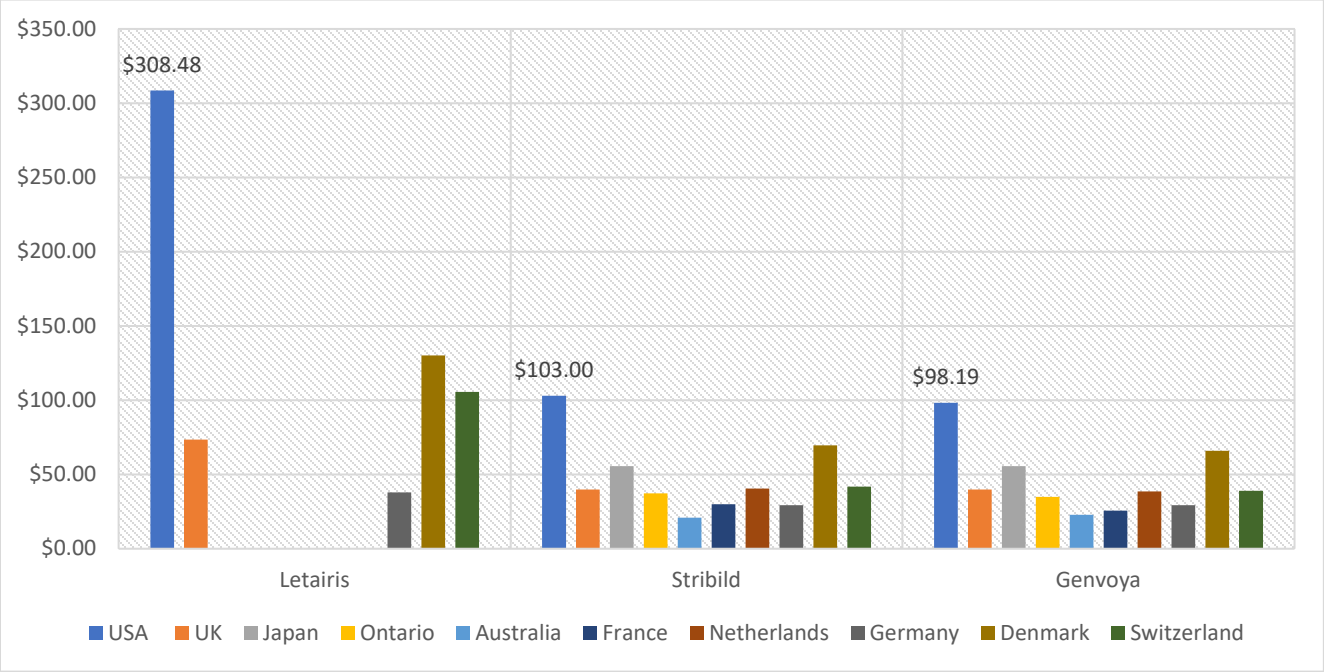
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Sovaldi were not available for Switzerland. Data on Letairis were not available for Japan, Ontario, Canada, Australia, Portugal, France, Netherlands, or Sweden. Data on Stribild, and Genvoya were not available for Portugal and Sweden. Data on Ranexa were not available for Japan, Ontario, Canada, Australia, France, Netherlands, Denmark, and Sweden.*

Figure 25. List Prices of Drugs Manufactured by Gilead Sciences, 2018



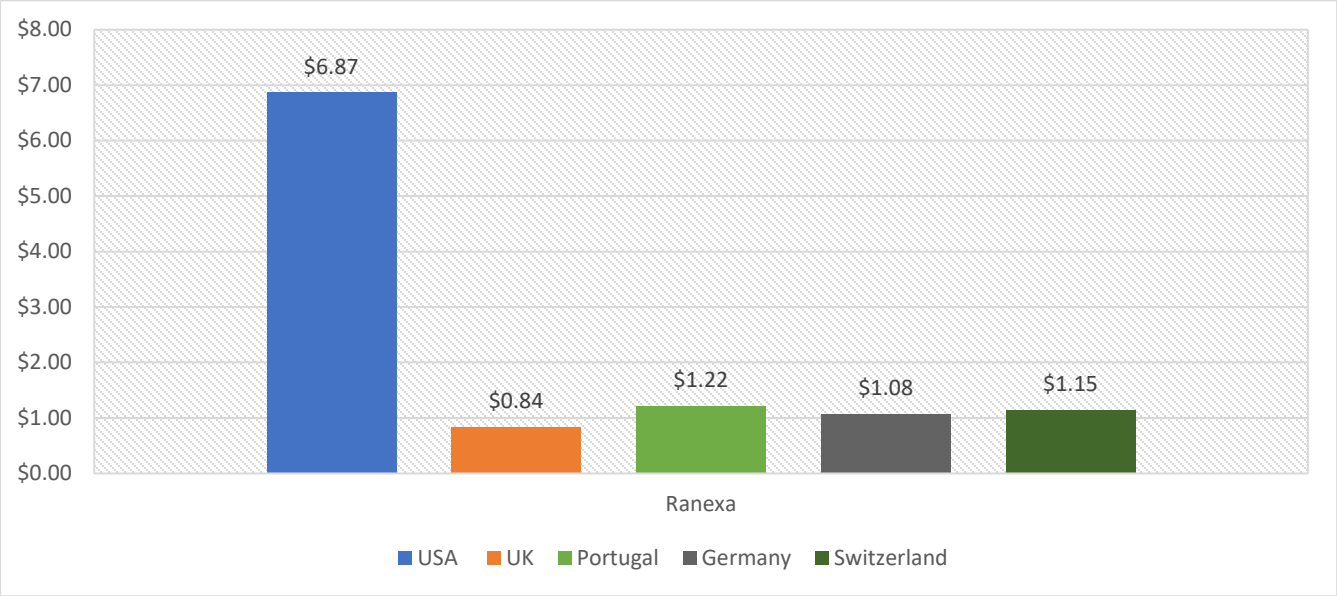
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Sovaldi were not available for Switzerland. We chose to compare these drugs separately in Figures 25, 25.B, and 25C to cross-compare their drug prices in each country.*

Figure 25.B. List Prices of Drugs Manufactured by Gilead Sciences, 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018 collected from recognized price sources. Data on Letairis were not available for Japan, Ontario, Canada, Australia, Portugal, France, Netherlands, or Sweden. Data on Stribild, and Genvoya were not available for Portugal and Sweden. We chose to compare these drugs separately in Figures 25, 25.B, and 25C to cross-compare their drug prices in each country.*

Figure 25.C. List Prices of Drugs Manufactured by Gilead Sciences, 2018



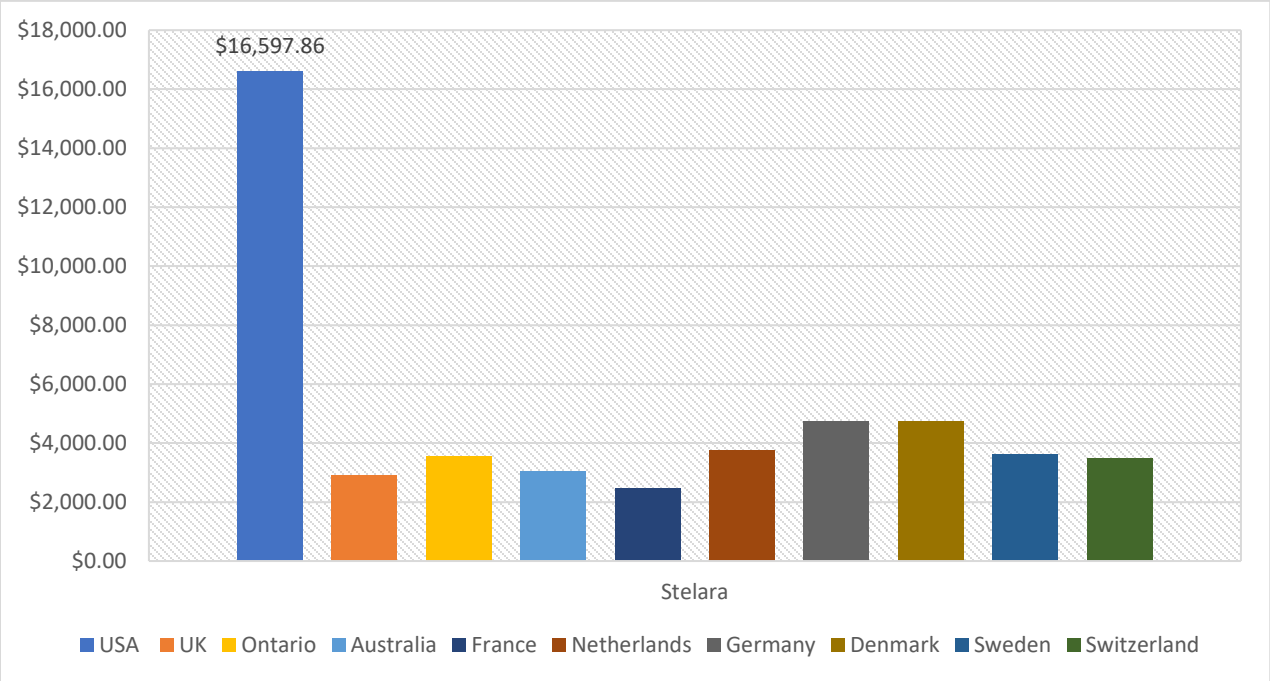
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Ranexa were not available for Japan, Ontario, Canada, Australia, France, Netherlands, Denmark, and Sweden. We chose to compare these drugs separately in Figures 25, 25.B, and 25C to cross-compare their drug prices in each country.*

Table 18. List Prices of Drugs Manufactured by Janssen, 2018

Janssen Drugs					
	Zytiga	**Stelara**	**Invokana**	**Xarelto**	**Prezista**
U.S.	$170.53	$16,597.86	$15.48	$13.95	$39.99
UK	$66.45	$2,921.09	$1.78	$2.45	$11.87
Japan	-	-	$1.53	$4.25	$11.30
Ontario	-	$3,557.82	$2.14	$2.22	$14.98
Australia	$20.02	$3,043.87	-	$1.22	$14.50
Portugal	$33.32	-	$2.03	$2.75	-
France	$50.80	$2,455.79	-	$1.96	$11.04
Netherlands	$67.18	$3,742.87	$1.84	$2.71	$12.81
Germany	$56.98	$4,728.76	-	$2.83	$25.68
Denmark	$80.36	$4,719.68	$2.35	$3.28	$18.81
Sweden	$47.17	$3,612.73	$1.46	$2.19	$7.63
Switzerland	$57.77	$3,475.85	$1.48	$2.61	$19.97

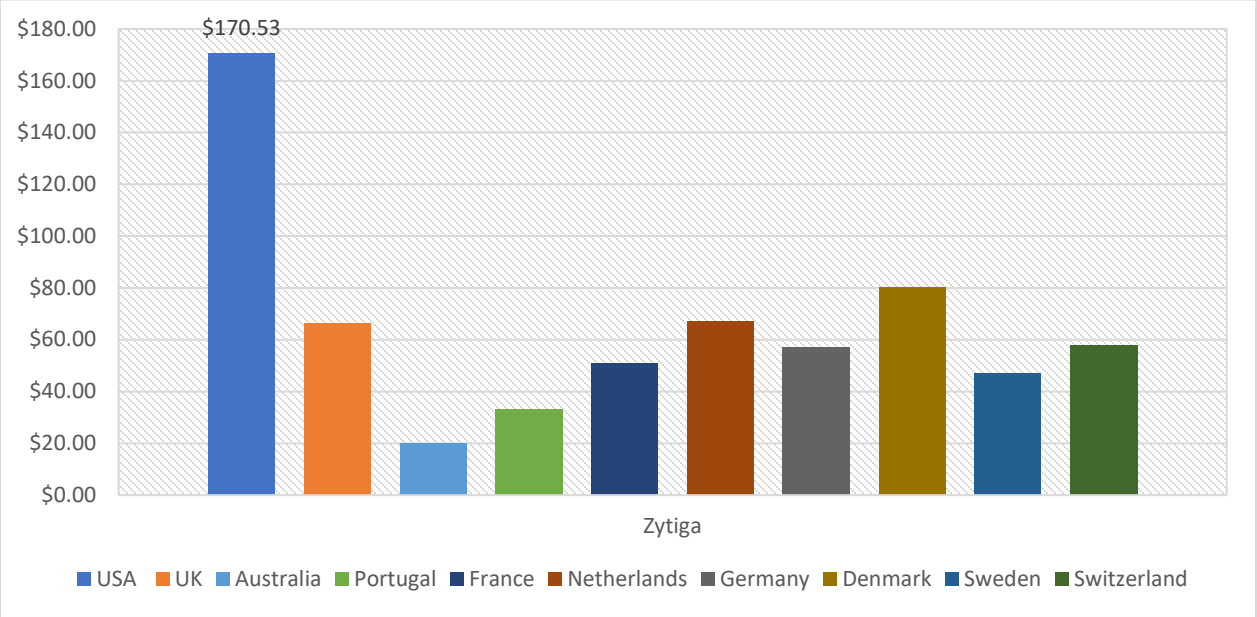
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Zytiga were not available for Japan or Ontario. Data on Stelara were not available for Japan or Portugal. Data on Invokana were not available for Australia, France, and Germany. Data on Prezista were not available for Portugal.*

Figure 26. List Prices of Drugs Manufactured by Janssen, 2018



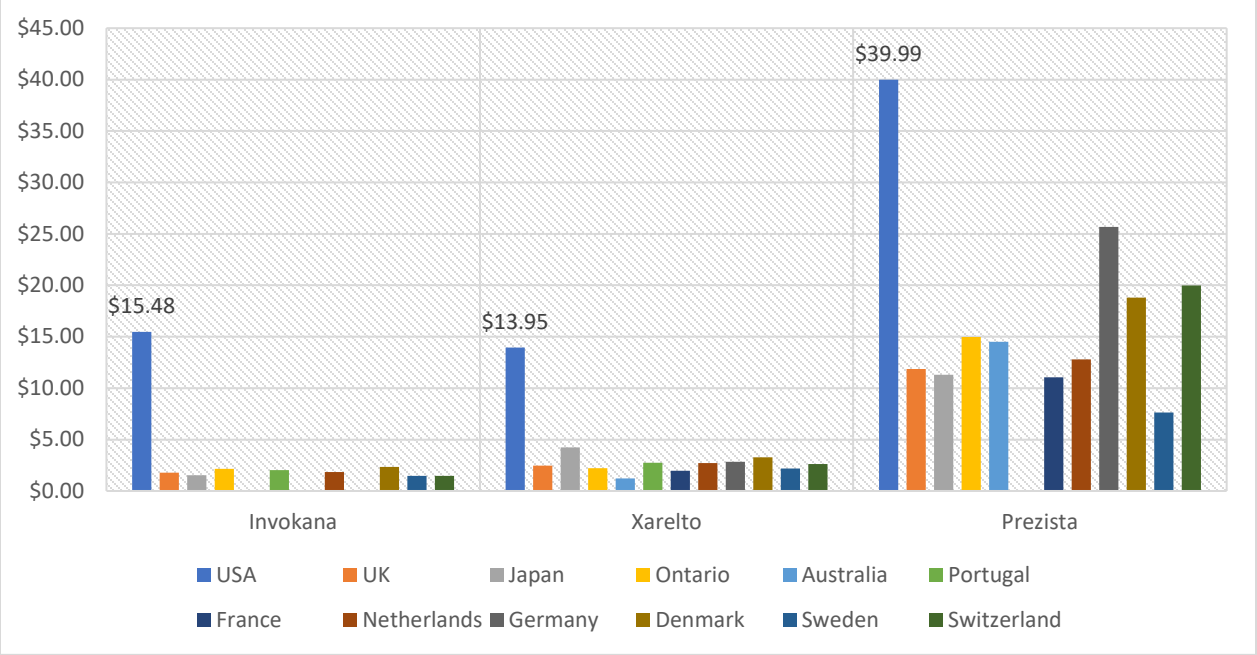
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Stelara were not available for Japan or Portugal. We chose to compare these drugs separately in Figures 26, 26.B, and 26C to cross-compare their drug prices in each country.*

Figure 26.B. List Prices of Drugs Manufactured by Janssen, 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Zytiga were not available for Japan or Ontario. We chose to compare these drugs separately in Figures 26, 26.B, and 26C to cross-compare their drug prices in each country.*

Figure 26.C. List Prices of Drugs Manufactured by Janssen, 2018



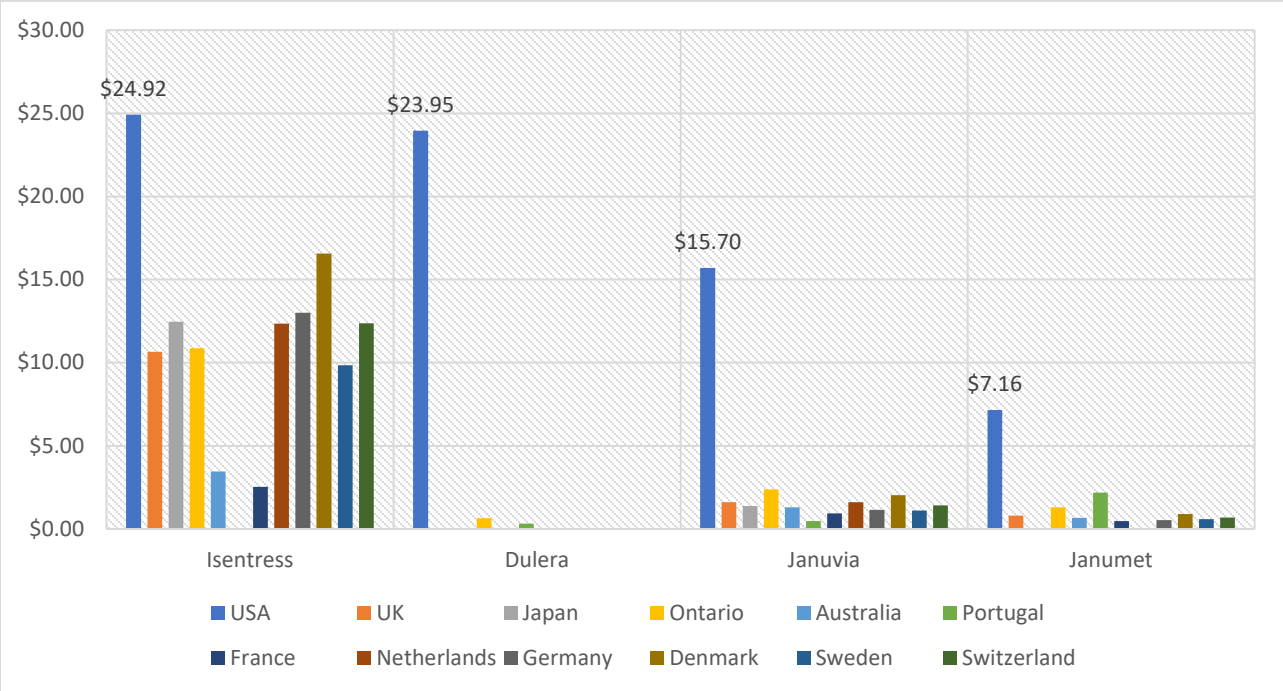
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Invokana were not available for Australia, France, and Germany. Data on Prezista were not available for Portugal. We chose to compare these drugs separately in Figures 26, 26.B, and 26C to cross-compare their drug prices in each country.*

Table 19. List Prices of Drugs Manufactured by Merck & Co., 2018

Merck & Co Drugs				
	Isentress	**Dulera**	**Januvia**	**Janumet**
U.S.	$24.92	$23.95	$15.70	$7.16
UK	$10.66	-	$1.62	$0.81
Japan	$12.46	-	$1.38	-
Ontario	$10.87	$0.65	$2.39	$1.30
Australia	$3.46	-	$1.30	$0.67
Portugal	-	$0.32	$0.48	$2.19
France	$2.53	-	$0.94	$0.47
Netherlands	$12.35	-	$1.61	-
Germany	$13.00	-	$1.15	$0.54
Denmark	$16.56	-	$2.03	$0.90
Sweden	$9.84	-	$1.11	$0.59
Switzerland	$12.37	-	$1.42	$0.69

SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Isentress were not available for Portugal. Data on Dulera were not available for the UK, Japan, Australia, France, Netherlands, Germany, Denmark, or Sweden. Data on Janumet were not available for Japan or Netherlands.*

Figure 27. List Prices of Drugs Manufactured by Merck & Co., 2018



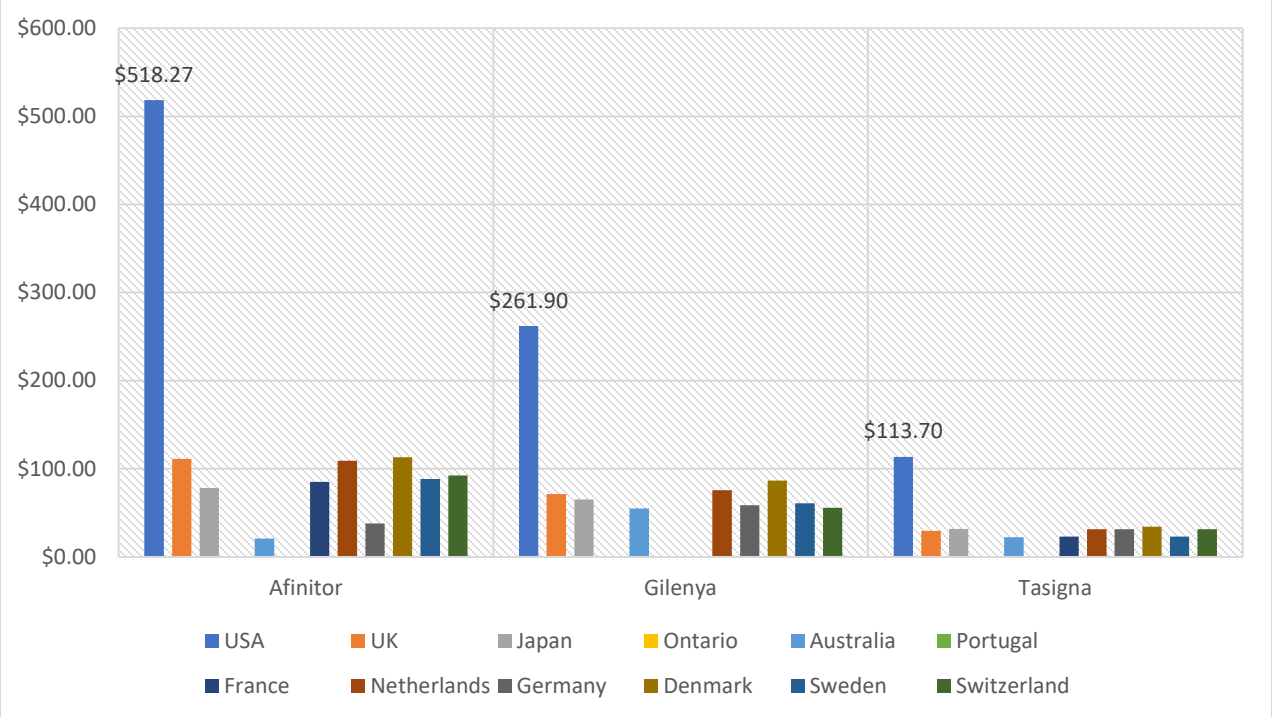
SOURCES and NOTES: *Authors' analysis of price data for 2018 collected from recognized price sources. Data on Isentress were not available for Portugal. Data on Dulera were not available for the UK, Japan, Australia, France, Netherlands, Germany, Denmark, or Sweden. Data on Janumet were not available for Japan or Netherlands.*

Table 20. List Prices of Drugs Manufactured by Novartis, 2018

Novartis Drugs			
	Afinitor	**Gilenya**	**Tasigna**
U.S.	$518.27	$261.90	$113.70
UK	$111.34	$71.43	$29.55
Japan	$78.42	$65.34	$31.97
Ontario	-	-	-
Australia	$20.80	$55.23	$22.43
Portugal	-	-	-
France	$85.23	-	$22.99
Netherlands	$109.24	$75.91	$31.59
Germany	$37.88	$58.76	$31.35
Denmark	$113.25	$86.74	$34.51
Sweden	$88.63	$60.83	$23.20
Switzerland	$92.50	$55.99	$31.35

SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Afinitor, Gilenya, and Tasigna were not available for Ontario or Portugal. Data on Gilenya were also not available for France.*

Figure 28. List Prices of Drugs Manufactured by Novartis, 2018



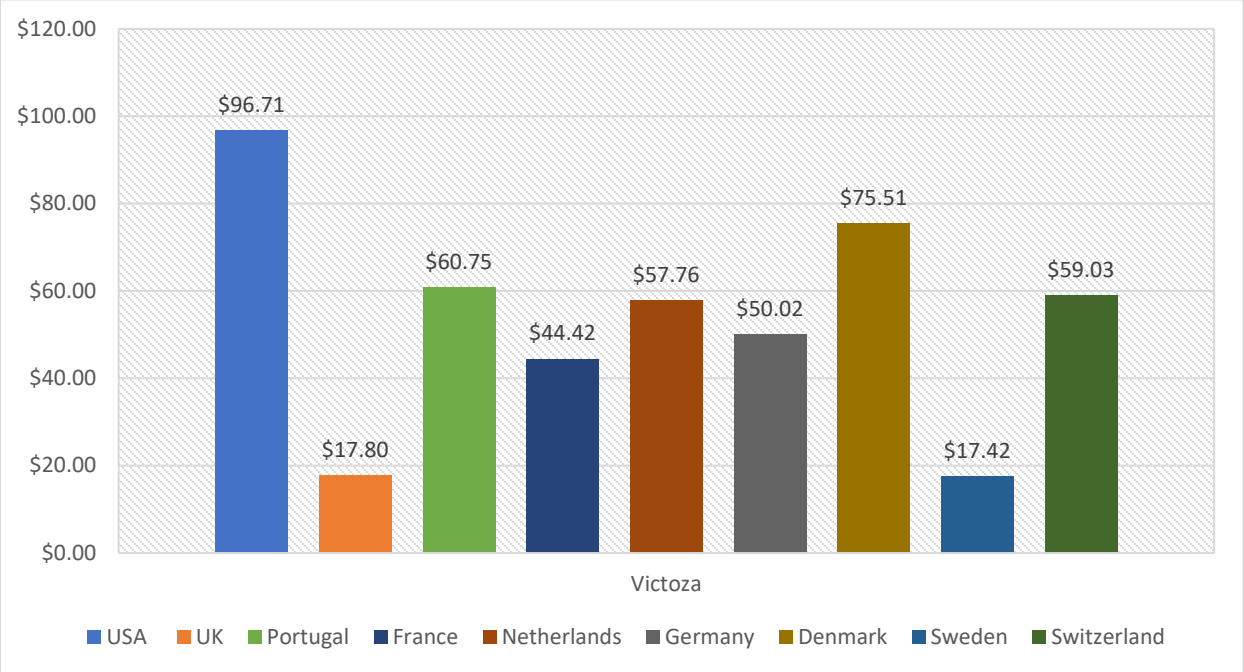
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Afinitor, Gilenya, and Tasigna were not available for Ontario or Portugal. Data on Gilenya were also not available for France.*

Table 21. List Prices of Drugs Manufactured by Novo Nordisk, 2018

Novo Nordisk Drugs					
	Victoza	**NovoLOG Flexpen**	**NovoLOG**	**Levemir Flextouch**	**Levemir**
U.S.	$96.71	$37.26	$36.55	$29.38	$29.38
UK	$17.80	$2.78	$2.74	$3.81	$3.81
Japan	-	-	-	-	-
Ontario	-	$3.26	$2.79	$5.62	$5.62
Australia	-	$14.46	$14.46	$48.70	$48.70
Portugal	$60.75	$9.75	$23.56	$13.96	$13.96
France	$44.42	$6.73	$5.71	$9.66	$9.66
Netherlands	$57.76	$4.54	-	$13.17	$12.91
Germany	$50.02	$10.43	-	$12.26	$11.96
Denmark	$75.51	$4.73	$4.17	$5.34	$5.34
Sweden	$17.42	$6.10	$6.96	$10.67	$11.54
Switzerland	$59.03	$9.77	$9.15	-	$14.11

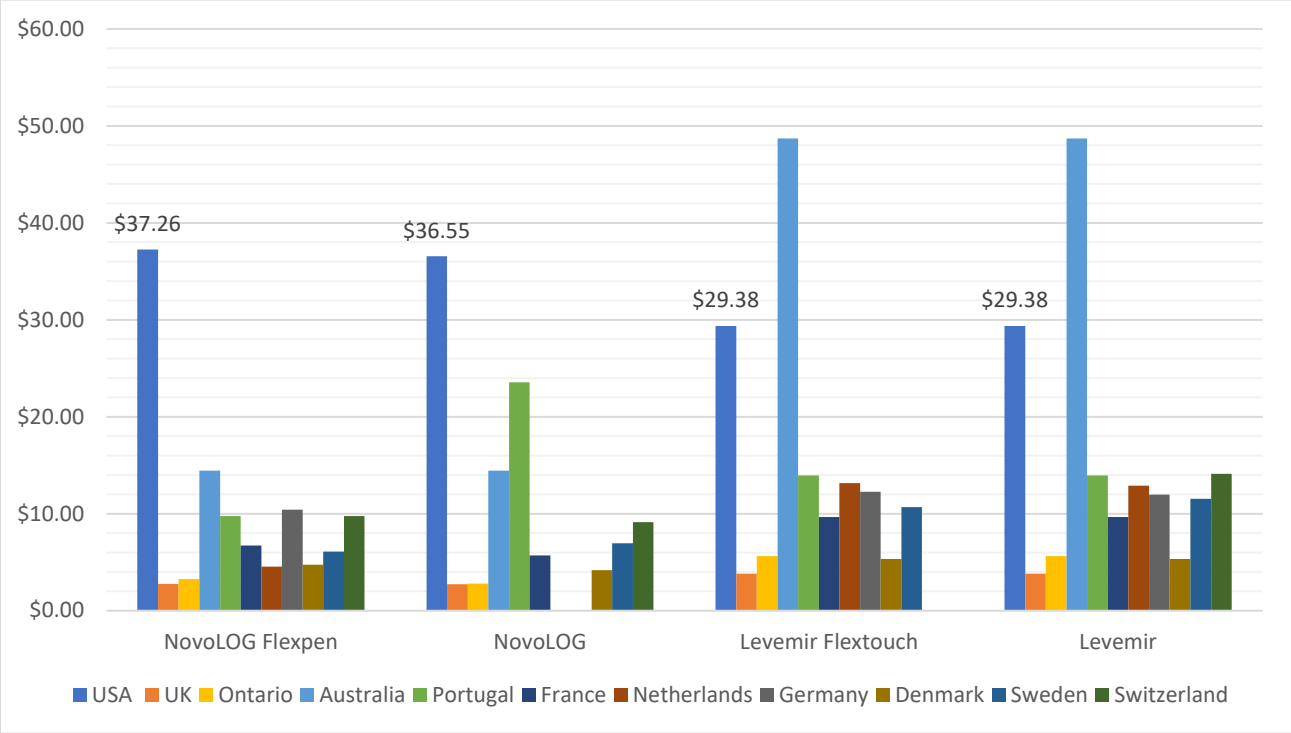
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price. Data on Victoza, NovoLOG Flexpen, NovoLOG, Levemir Flextouch, and Levemir were not available for Japan. Data on Victoza were not available for Ontario, or Australia. Data on NovoLOG were not available for Japan, the Netherlands, or Germany. Data on Levemir Flextouch were not available for Switzerland.*

Figure 29. List Prices of Drugs Manufactured by Novo Nordisk, 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Victoza were not available for Ontario, Australia, or Japan. We chose to compare these drugs separately in Figures 29 and 29B to cross-compare their drug prices in each country.*

Figure 29.B List Prices of Drugs Manufactured by Novo Nordisk, 2018



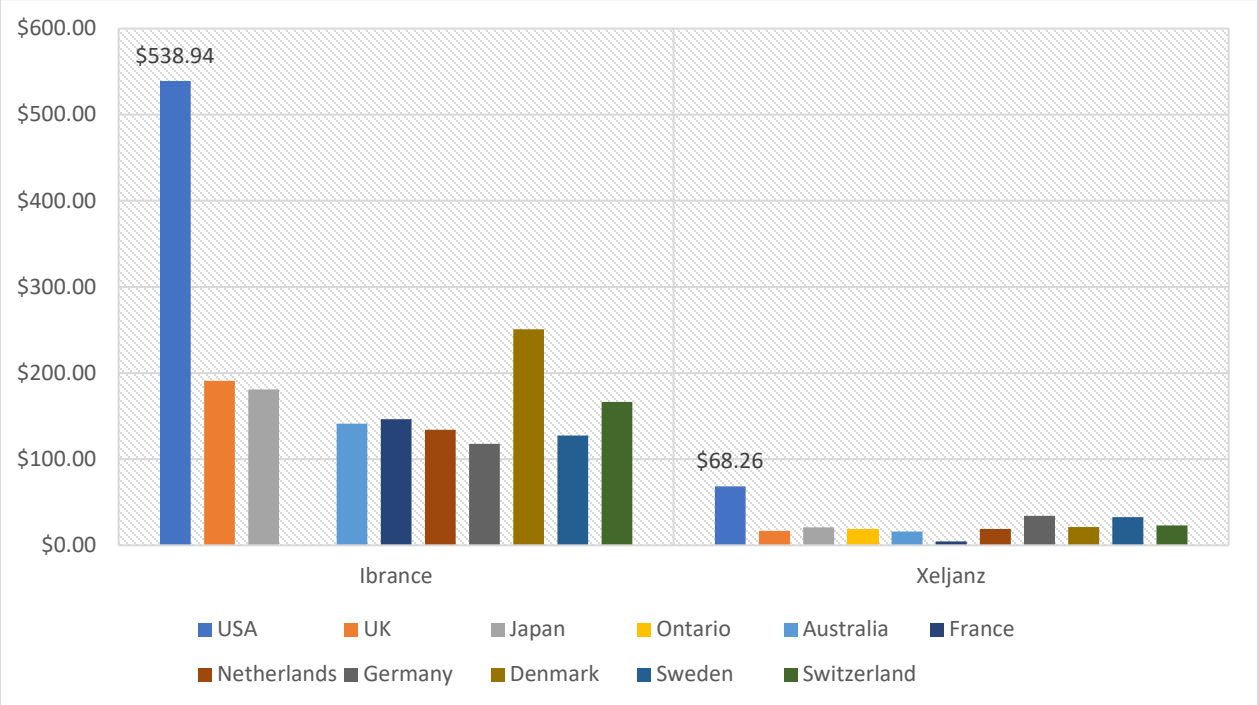
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on NovoLOG Flexpen, NovoLOG, Levemir Flextouch, and Levemir were not available for Japan. Data on NovoLOG were not available for Japan, the Netherlands, or Germany. Data on Levemir Flextouch were not available for Switzerland. We chose to compare these drugs separately in Figures 29 and 29B to cross-compare their drug prices in each country.*

Table 22. List Prices of Drugs Manufactured by Pfizer, 2018

Pfizer Drugs		
	Ibrance	**Xeljanz**
U.S.	$538.94	$68.26
UK	$191.12	$16.76
Japan	$180.90	$20.94
Ontario	-	$18.56
Australia	$141.30	$15.85
Portugal	-	-
France	$146.43	$4.67
Netherlands	$134.24	$19.12
Germany	$117.84	$34.36
Denmark	$250.70	$21.09
Sweden	$127.38	$32.71
Switzerland	$166.50	$23.02

SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Ibrance were not available for Ontario or Portugal. Data on Xeljanz were not available for Portugal.*

Figure 30. List Prices of Drugs Manufactured by Pfizer, 2018



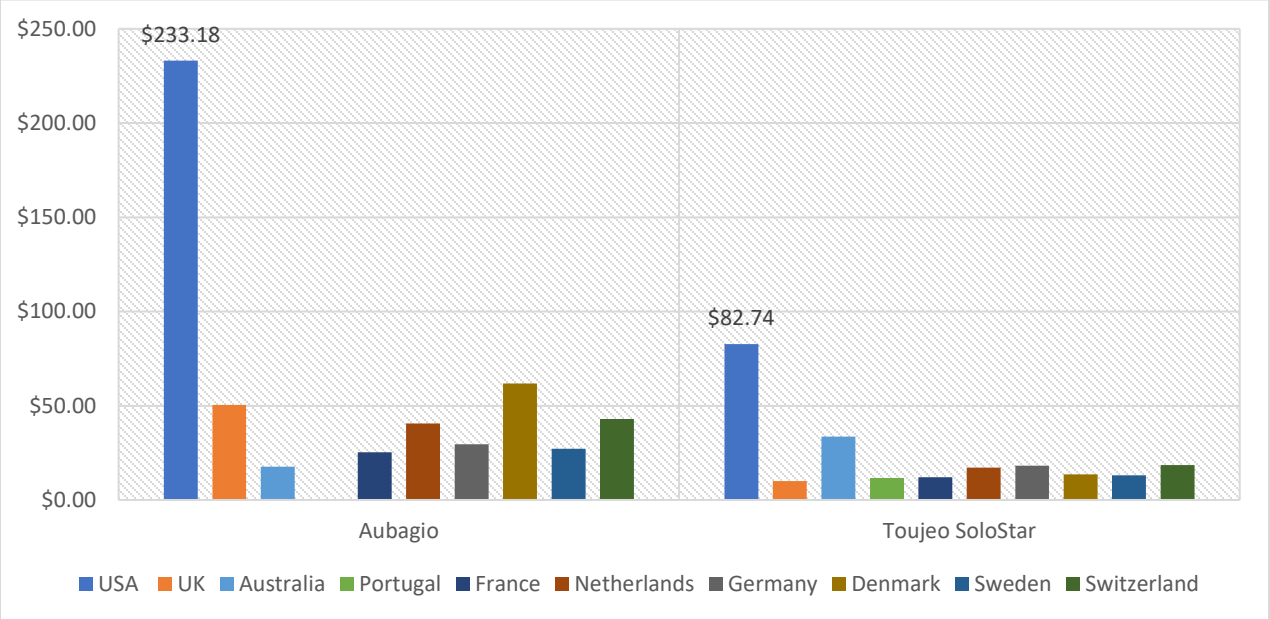
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Ibrance were not available for Ontario or Portugal. Data on Xeljanz were not available for Portugal.*

Table 23. List Prices of Drugs Manufactured by Sanofi-Aventis, 2018

Sanofi-Aventis Drugs					
	Aubagio	**Toujeo SoloStar**	**Lantus**	**Lantus SoloStar**	**Multaq**
U.S.	$233.18	$82.74	$26.96	$26.95	$10.51
UK	$50.43	$10.02	$3.43	$26.95	$1.53
Japan	-	-	-	$3.43	-
Ontario	-	-	$4.78	$5.17	-
Australia	$17.62	$33.64	$33.64	$16.82	-
Portugal	-	$11.16	$45.45	$45.45	$1.87
France	$25.29	$12.06	$8.78	$8.78	-
Netherlands	$40.57	$17.12	$11.11	$11.21	-
Germany	$29.54	$18.24	$12.16	-	$1.55
Denmark	$61.82	$13.55	$5.26	$5.26	$1.81
Sweden	$27.18	$13.03	$0.00	$26.70	$1.51
Switzerland	$43.04	$18.50	$10.36	$8.81	$1.53

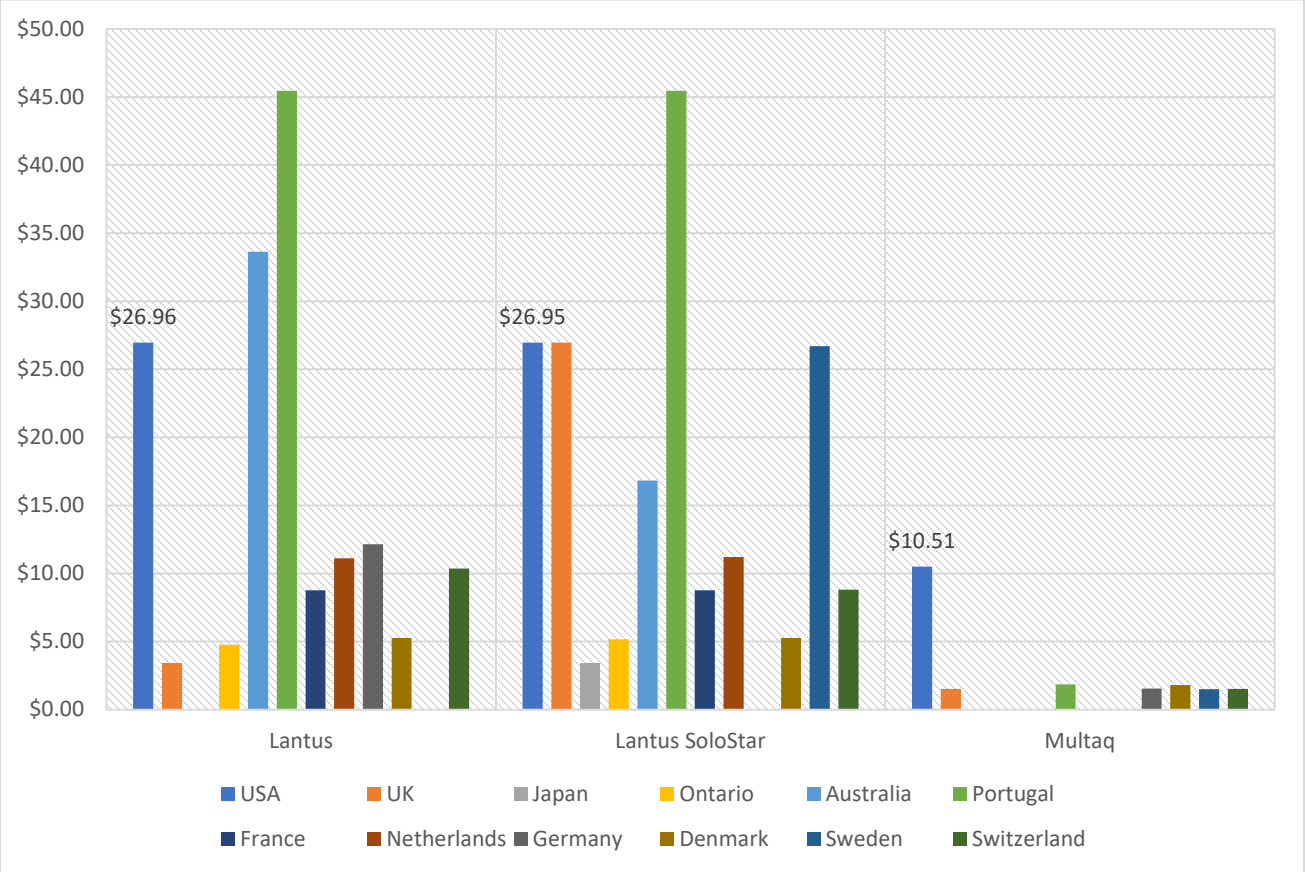
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Aubagio were not available for Japan, Ontario, or Portugal. Data on Toujeo SoloStar were not available for Japan or Ontario. Data on Lantus were not available for Japan. Data on Lantus Solostar were not available for Germany. Data on Multaq were not available for Japan, Ontario, Australia, France, or the Netherlands.*

Figure 31. List Prices of Drugs Manufactured by Sanofi-Aventis, 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Aubagio were not available for Japan, Ontario, or Portugal. Data on Toujeo SoloStar were not available for Japan or Ontario. Data on Lantus were not available for Japan. We chose to compare these drugs separately in Figures 31 and 31B to cross-compare their drug prices in each country.*

Figure 31.B. List Prices of Drugs Manufactured by Sanofi-Aventis, 2018



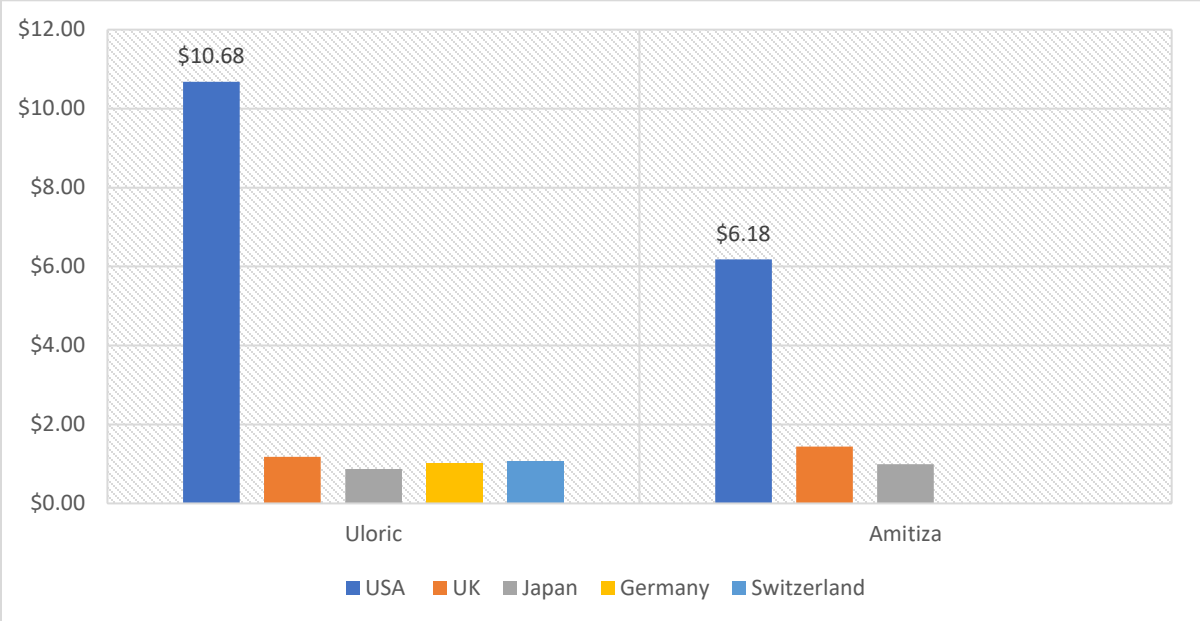
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Lantus were not available for Japan. Data on Lantus Solostar were not available for Germany. Data on Multaq were not available for Japan, Ontario, Australia, France, or the Netherlands. We chose to compare these drugs separately in Figures 31 and 31B to cross-compare their drug prices in each country.*

Table 24. List Prices of Drugs Manufactured by Takeda Pharmace, 2018

Takeda Pharmace Drugs		
	Uloric	**Amitiza**
U.S.	$10.68	$6.18
UK	$1.18	$1.44
Japan	$0.87	$0.99
Ontario	-	-
Australia	-	-
Portugal	-	-
France	-	-
Netherlands	-	-
Germany	$1.02	-
Denmark	-	-
Sweden	-	-
Switzerland	$1.08	-

SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price. Data on Uloric were not available for Ontario, Australia, Portugal, France, Netherlands, Denmark, and Sweden. Data on Amitiza were not available for Ontario, Australia, Portugal, France, Netherlands, Germany, Denmark, Sweden, or Switzerland.*

Figure 32. List Prices of Drugs Manufactured by Takeda Pharmace, 2018



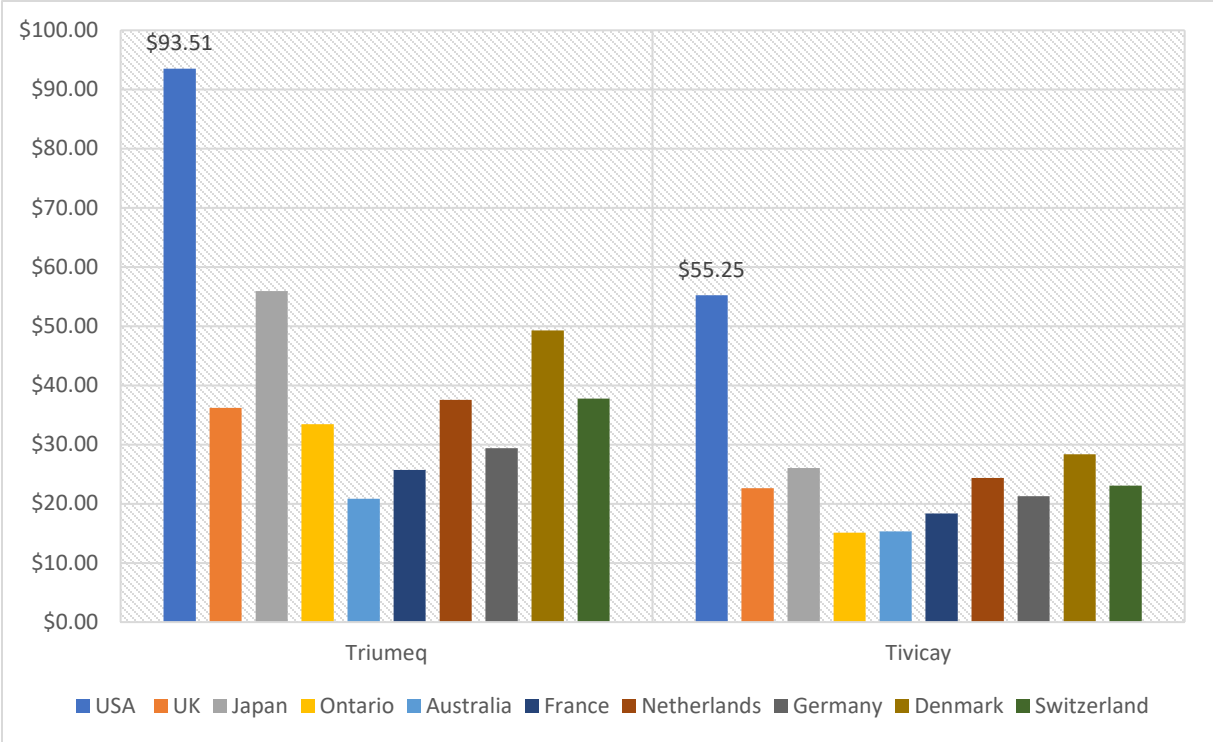
SOURCES and NOTES: *Authors' analysis of price data for 2018, collected from recognized price sources. Data on Uloric were not available for Ontario, Australia, Portugal, France, Netherlands, Germany, Denmark, Sweden, and Switzerland. Data on Amitiza were not available for Ontario, Australia, Portugal, France, Netherlands, Germany, Denmark, Sweden, or Switzerland.*

Table 25. List Prices of Drugs Manufactured by Viiv Healthcare, 2018

Viiv Healthcare Drugs		
	Triumeq	**Tivicay**
U.S.	$93.51	$55.25
UK	$36.20	$22.62
Japan	$55.91	$26.05
Ontario	$33.46	$15.10
Australia	$20.83	$15.30
Portugal	-	-
France	$25.72	$18.37
Netherlands	$37.56	$24.34
Germany	$29.38	$21.28
Denmark	$49.26	$28.34
Sweden	-	-
Switzerland	$37.75	$23.08

SOURCES and NOTES: *Authors' analysis of price data for 2018 collected from recognized price sources. Data on Triumeq and Tivicay were not available for Portugal or Sweden.*

Figure 33. List Prices of Drugs Manufactured by Viiv Healthcare, 2018



SOURCES and NOTES: *Authors' analysis of price data for 2018 collected from recognized price sources. Data on Triumeq and Tivicay were not available for Portugal or Sweden.*