Unravelling the Drug Pricing Blame Game

Analyzing the factors influencing prescription drug costs at U.S. retail pharmacies

Prepared for —

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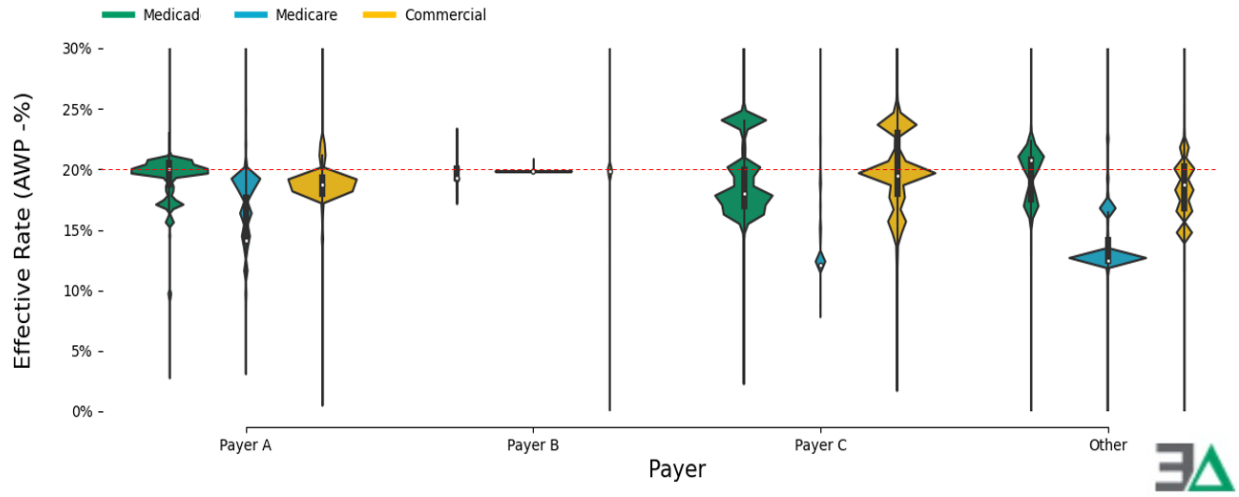
THREE AXIS ADVISORS

Executive Summary

Prior to the COVID-19 pandemic, few healthcare issues received as much attention and public discourse as prescription drug prices. The attention paid to the costs of pharmaceuticals is understandable when one considers that, in many ways, medicines are arguably the backbone of the U.S. healthcare delivery system. Whether a person is seeking treatment for a simple infection or complex diseases like cancer or multiple sclerosis, prescription drugs are the primary tools employed by our nation's healthcare professionals to address illness. Moreover, prescription drugs are often the goal of researchers who are looking to offer solutions for medical conditions without current treatments. However, informed debate over drug prices is challenging because the nature of drug prices requires layers of context. That said, the common understanding of the American public appears to be that the pricing practices of drug manufacturers are primarily to blame for high drug costs. (1) While there is certainly truth to the notion that drug manufacturers are key contributors to the prices paid for medicines, our study of 32.6 million retail pharmacy claims from independent, small chain, and mid-size chain pharmacies over a 12-month period between January 1, 2020 and December 31, 2020 finds that a great deal more context is needed to understand drug prices at the pharmacy counter.

More specifically, in our analysis, we find that the overwhelming majority of the prices paid at the pharmacy counter are based on price points established by the drug supply chain intermediaries known as pharmacy benefit managers (PBMs). For expensive brand medications, the data demonstrates that PBMs establish variable payment rates based upon differentiating the discounts offered to manufacturer price points (**Chart 1** below).

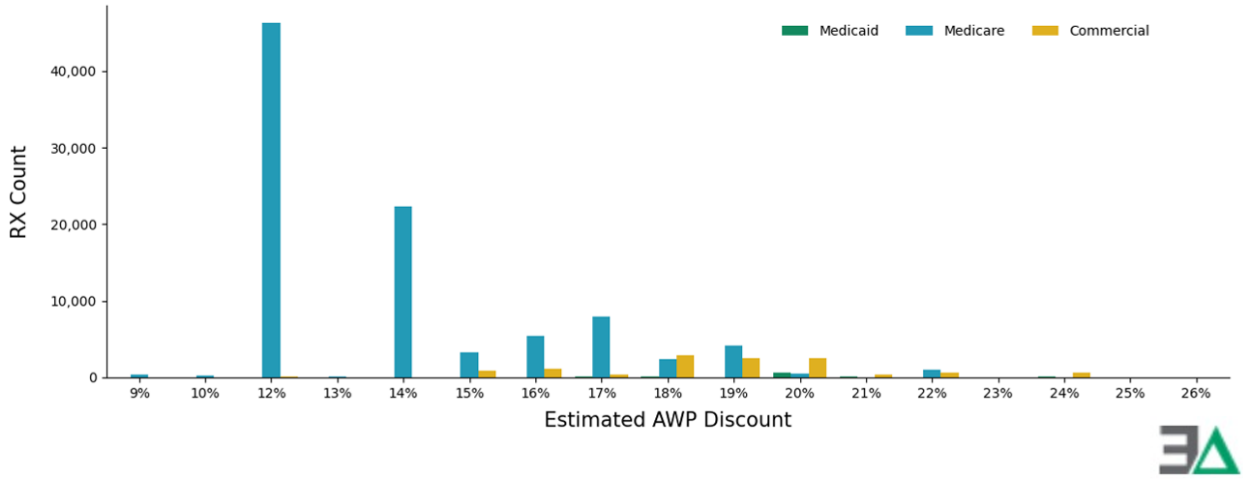
Chart 1: Distribution of Brand Average Wholesale Price (AWP) Discounts by Payer and Line of Business for Claims where the Drug Manufacturer's List Price was Used by the PBM as the Basis of Payment (Studied Pharmacy Data, 2020)



Digging deeper, we observed how a brand medication (Eliquis), with one established manufacturer price point for 2020, can have a variety of pharmacy counter prices, irrespective

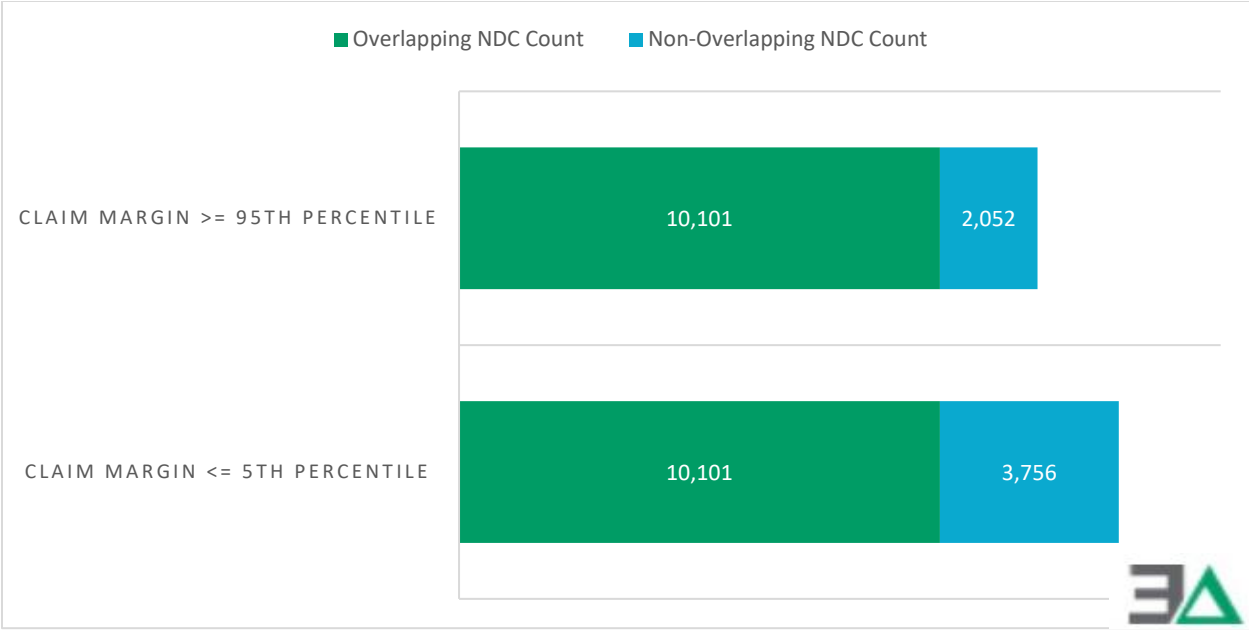
of its unchanging list price and even when controlling for the PBM setting the drug discount (**Chart 2** below).

Chart 2: Eliquis Reimbursement Distribution by Line of Business for Largest PBM in Studied Pharmacy Data (2020)



For generic medications, the most routinely utilized of all drug therapies, we observed that proprietary PBM prices (i.e., maximum allowable cost, or MAC) were used for setting the majority of all prescription costs and that like their brand counterparts, generic drug prices were highly variable and disconnected from the manufacturer or pharmacy established price for the medication. For example, we identified that within the claims where pharmacies lost and made the most money (i.e., margin), the same national drug codes (NDCs) were present in both extremes 44.6% of the time – meaning that the same drug could be responsible for both the highest profits and the biggest losses for pharmacies (**Chart 3** below).

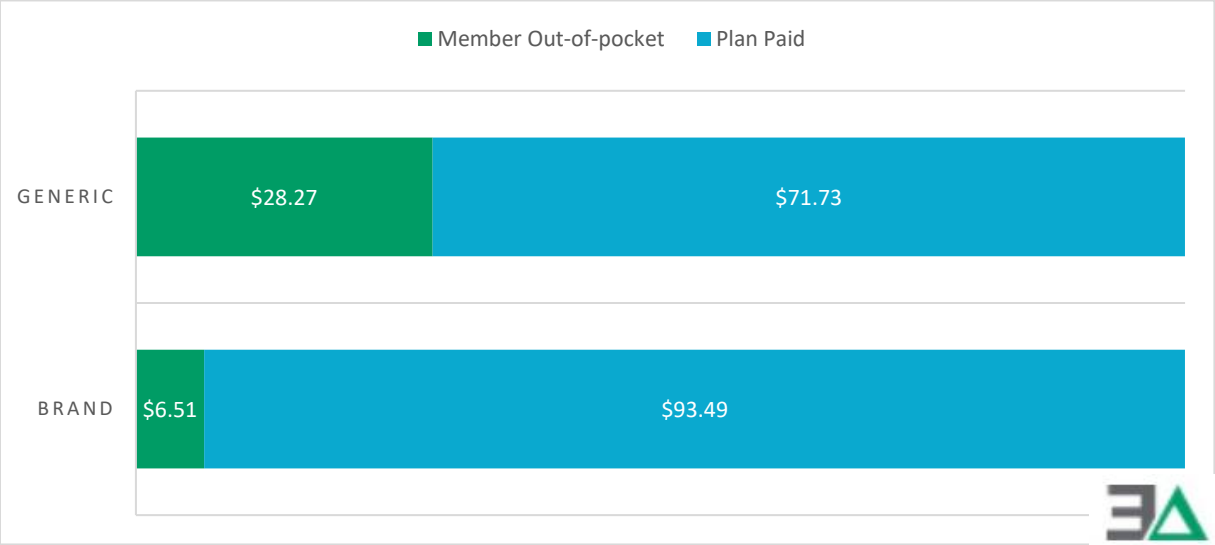
Chart 3: Count of Overlapping Unique NDCs Between Lowest and Highest Percentile of Claims by Margin Relative to National Average Drug Acquisition Cost (NADAC), (Studied Pharmacy Data, 2020)



If pharmacies are to make drug acquisition and purchasing decisions based on the incentives of drug reimbursement (the purported rationale for generic drug pricing), it is difficult to rationalize what incentive actually exists when the majority of claims appear just as likely to result in favorable reimbursement as will result in unfavorable reimbursement.

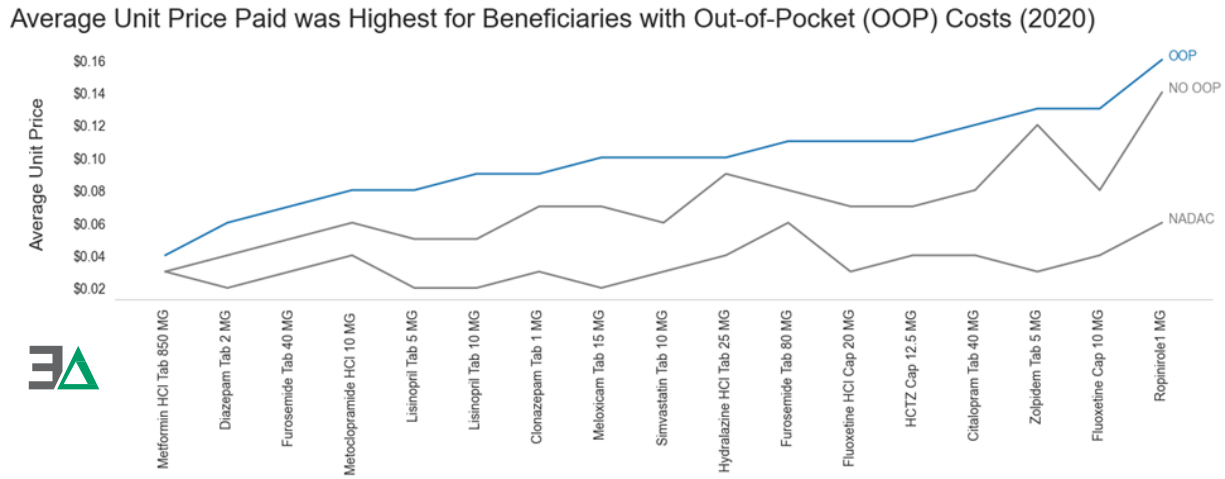
Our study found that the greatest harm from our system's current approach to drug pricing appears to be on patients. Though variability in drug prices appears greatest on generic drugs, patients are sharing in more of these drug costs relative to brands (**Chart 4** below). This observation signals that patients are at greatest risks of directly experiencing the extreme ends of drug pricing variability.

Chart 4: Comparison of Member Out-of-Pocket Drug Costs, $100 of Brand Costs vs. $100 of Generic Costs (Studied Pharmacy Data, 2020)



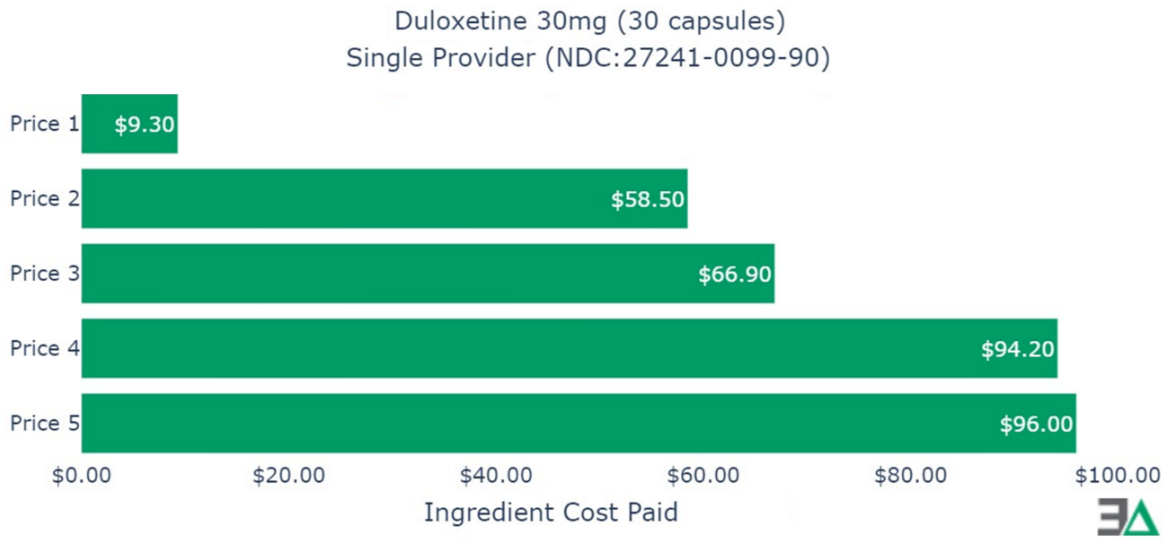
Our findings confirm that, for at least a subset of drugs, claim costs are higher when patients and health plans are sharing drug costs rather than when health plans alone being responsible for drug costs. (**Chart 5** below).

Chart 5: Comparison of Drug Costs Based Upon Presence or Absence of Patient Cost Share, Selected Drugs (2020)



Ultimately, we observe that the drug prices experienced at the pharmacy counter in 2020 were set in highly inconsistent and irregular ways. Within this report, we repeatedly observed drugs with known low acquisition costs, such as duloxetine, having multiple (and highly varied) price points – price points that cannot be readily attributed to either the drug manufacturer or the pharmacy provider. The most extreme example of this was a single pharmacy who, on a single day, for the same product (on an NDC basis), at the same quantity, was paid five unique prices by the same PBM, ranging from $9.30 per prescription to $96 per prescription (**Chart 6** below).

Chart 6: Same Provider, PBM, and Day Analysis on Duloxetine 30 mg Pricing



On this day, there was only one acquisition cost for this NDC by the pharmacy (as represented by NADAC). Similarly, on this same day, there was only one set of manufacturer-established price points (as represented by WAC and/or AWP). No system predicated on manufacturer prices, and manufacturer prices alone, could produce the results in **Chart 6**. The result of this system design exposed patients and health plans to drug prices at the pharmacy counter that were up to a 10-fold difference despite the same pharmacy, dispensing the same drug, on the same day, to patients covered by the same PBM. Furthermore, we cannot readily explain what was accomplished through these kinds of drug price-setting disparities and inequity.

While these disparate pricing experiences can have a significant impact on pharmacy providers and health plan sponsors, the most obvious and important impact is felt by the patient, whose costs for their medicines are often derived by the point-of-sale prices that are yielded by their health benefits plan and PBM.

Ultimately, the findings in this study underscore the complexity, inconsistency, and malleable nature of drug pricing in the United States, where public policy goals for reform are scattered but loosely centered on a quest for affordability and value. With this in mind, this report demonstrates that the current system is full of inequity and misaligned incentives that would seem to run counter to these goals. Addressing the current system dysfunction that exposes many to inflated, varied, and frankly, unfounded drug prices appears to be as rational of an approach as any other potential policy goal for reforming the U.S. drug distribution system.

Acknowledgements

The goal of this project, on its surface, seemed simple enough – to understand the mechanics of $535 billion in gross U.S. prescription drug spending in 2020. (2) More specifically, our past research and analytics work has uncovered numerous instances of significant pricing disparities for drugs covered by health insurance at retail pharmacies. As way of example, in our 2022 Oregon study, we found many equivalent and interchangeable generic drugs were experiencing 100-fold or greater differences in the minimum and maximum observed PBM reimbursement rate. (3) These findings piqued our interest; so, we set out with this study with a goal of better understanding the process of setting what appear to be arbitrary prices for drugs of the same manufacturer, during the same period, with benefits administered by the same PBM, and the impact these prices have on patients. But the journey to sufficiently answer our questions ended up being much more onerous than we expected, taking nearly a year of research, analysis, writing, and editing to complete.

It goes without saying that we could not have devoted even a fraction of the time spent on this project had it not been for the financial support of the American Pharmacy Cooperative, Inc (APCI). We are immensely grateful for organizations like APCI, as if it were not for them, there would be little resources available for exploratory research and analysis of the U.S. prescription drug supply chain.

Additionally, we would like to thank the many pharmacies across the country who have voluntarily turned over pharmacy claims data de-identified of any protected health information to help us better understand the dynamics at play in the prescription drug supply chain for this report and some of our previous works as well. There is no narrative and context to drug pricing research and analysis without data, and these pharmacies are quite literally on the front lines every day serving patients and delivering healthcare services that we get the opportunity to study in data.

We would also like to thank the many members of the media, whose work provides much of the fundamental knowledge of the past. If not for the important work of journalists, much of this type of research would not have been possible.

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Introduction

In a late 2021 study, the Kaiser Family Foundation found that eight in ten adults say the cost of prescription drugs is unreasonable, with nearly three in ten identifying that they haven't taken their medicine as prescribed due to cost. (1) The exorbitant prices of prescription drugs in the United States have long been a subject of public debate, evoking concerns about affordability, accessibility, and equitable healthcare. As the world's largest pharmaceutical market, the U.S. faces unique challenges in balancing the pursuit of pharmaceutical innovation and affordability of those drug products. However, the question of who is ultimately to blame for the high drug costs of U.S. consumers remains a consistently contentious issue, with various stakeholders pointing fingers at one another for their respective roles in undermining a more affordable system.

Pharmaceutical companies undoubtedly hold a central position in the drug pricing landscape. Their investments in research and development (R&D), production, and marketing contribute to the creation and availability of life-saving medications. However, critics argue that the current pricing strategies employed by pharmaceutical companies prioritize profit margins over affordability. (4) Their arguments focus on the intricate web of patents, intellectual property rights, and market exclusivity provisions as demonstrating that drug manufacturers shield themselves from otherwise competitive forces, enabling them to set prices without facing traditional market constraints. Nevertheless, manufacturer-set prices are just the beginning of the drug pricing paradigm in the U.S.

In every marketplace transaction, there is a seller and a buyer that come together to yield an agreed upon value pursuant to the exchange of goods and services. In the prescription drug supply chain, if drug manufacturers are the sellers, then the predominant buyers would be insurance providers and their pharmacy benefit managers (PBMs), who also play a pivotal role in shaping drug costs, as third-party payers make up approximately 95% of all pharmacy transactions. (5) These PBM intermediaries negotiate drug prices with manufacturers and pharmacy providers on behalf of health insurers and plan sponsors, aiming to strike a balance between affordability and coverage. However, the opacity surrounding PBM rebate negotiations, formulary placements, proprietary pricing lists, and patient cost-sharing arrangements often leads to confusion among patients, healthcare providers, and plan sponsors about what drug costs actually are. This raises questions about the extent to which insurance practices contribute to the high costs borne by patients at the pharmacy counter. (6) (7)

Healthcare professionals and patients also play a significant role in the drug pricing ecosystem. Prescribing decisions made by physicians, the incentives of pharmacy provider compensation, and the demand for certain medications can indirectly contribute to increased and inflated costs. Patients – especially those burdened by high out-of-pocket expenses – may face difficult choices regarding medication adherence due to affordability constraints, leading to potential adverse health outcomes. At the same time, demand for drug therapy can put upward pressure on price, particularly if the demand for such product outpaces its supply. (8)

This paper will seek to add to the existing understanding of the role the various parties play in shaping U.S. drug prices. At the outset, it is important to recognize that the blame for high drug prices cannot be attributed to a single entity. Rather, it is a culmination of interrelated factors

that have led to the current state of affairs. By analyzing retail pharmacy transactions (the principal way the average consumer gets their medications), we can pave the way for informed discussions and policy interventions aimed at striking a balance between innovation, accessibility, and affordability in the U.S. pharmaceutical market.

For this analysis on the origin of retail pricing experiences and disparities, we are analyzing 32.6 million retail pharmacy claims from independent, small chain, and mid-size chain pharmacies over a 12-month period between January 1, 2020 and December 31, 2020. This timeframe was selected, as it represents the intersection between the various 3 Axis Advisors research work to date, enabling the most complete picture of the retail marketplace we could construct based upon our past studies of drug pricing in the U.S.

Readers familiar with our work may find it beneficial to skip the **Brief Overview of the Drug Supply Chain, Drug Pricing Benchmarks and Prescription Drug Contracting** section of our report and begin on page 48 with the section titled **Attempting to Understand How Drug Prices Change at Retail Pharmacies**.

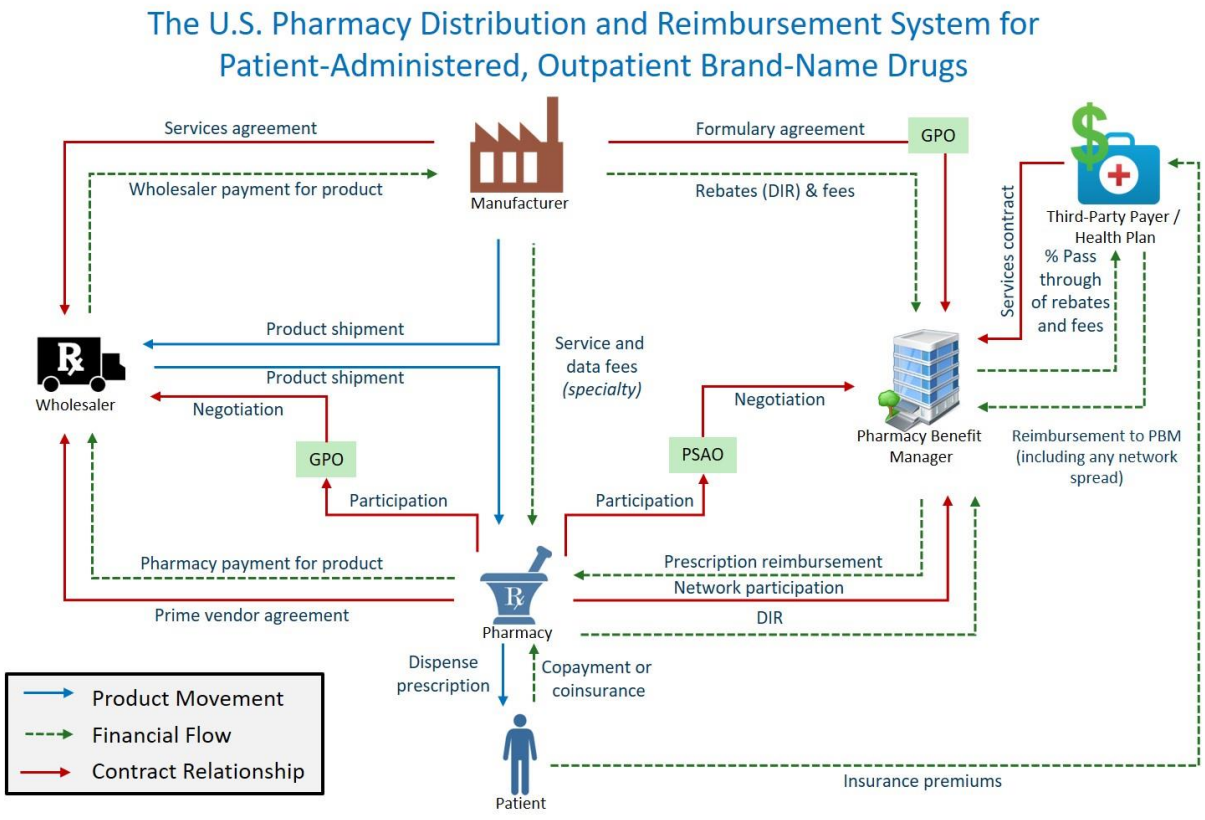
Brief Overview of the Drug Supply Chain, Drug Pricing Benchmarks, and Prescription Drug Contracting

Before we begin our analysis, we should recognize that U.S. drug pricing is complex. Thus, familiarity with common drug pricing benchmarks and the supply chain will assist in fully interpreting the analysis. Prior to beginning our analysis, the following sections are intended to be a brief introduction into the key factors that influence how patients pay for the medications they obtain.

The U.S. Prescription Drug Supply Chain

The U.S. prescription drug supply chain is the logistical process by which people produce, use, pay for, and manage medications. A complex network of stakeholders and processes are involved in getting medications to individuals who need them each and every day. **Figure 1** from the Drug Channels Institute provides the highest-level overview of the U.S. drug supply chain and just maybe the most famous diagram of its design and flow of dollars.

Figure 1: The U.S. Pharmacy Distribution and Reimbursement System for Retail Drugs, Drug Channels Institute (2023)



GPO = group purchasing organization; PSAO = pharmacy services administrative organization; DIR = direct and indirect remuneration
Source: *The 2023 Economic Report on U.S. Pharmacies and Pharmacy Benefit Managers* (https://drugch.nl/pharmacy). Chart illustrates flows for Patient-Administered, Outpatient Drugs. Please note that this chart is illustrative. It is not intended to be a complete representation of every type of product movement, financial flow, or contractual relationship in the marketplace.

DRUG CHANNELS INSTITUTE

Starting with the product (blue lines), the U.S. drug supply chain begins with pharmaceutical manufacturers ( ) who research, develop, and produce prescription drugs. Federal regulations are intended to ensure that drugs developed by manufacturers are safe and

effective before reaching U.S. consumers; however, drug manufacturers do not (in general) directly sell their products to pharmacies. (9) Rather, the largest customer of the physical products made by drug manufacturers is an often-overlooked group of stakeholders – drug wholesalers.

In the broader retail marketplace, wholesalers act as intermediaries between the producers and sellers of products. Drug wholesalers () are no different, acting as intermediaries between drug producers (i.e., manufacturers) and sellers of prescription medications (i.e., pharmacies). Drug wholesalers purchase medications in bulk from manufacturers and then sell and distribute those medications to various retail pharmacies, hospitals, clinics, and other healthcare facilities. Some of the largest corporations in America (McKesson, AmerisourceBergen, Cardinal Health) businesses principally involved in drug wholesaling. (10)

Drug wholesalers' primary customers are pharmacies (). Pharmacies, specifically retail pharmacies, are the principal means for patients to obtain prescription medications (the next most common being mail-order pharmacies and then clinics). (2) Pharmacists dispense drugs to patients, perform drug utilization review, provide medication counseling, and offer other pharmaceutical and clinical services. Such services can include healthcare screenings, drug administration, and disease state management programs. A pharmacy's customers include both the patient and the patient's insurance (as both will be involved in compensating the pharmacy for their products and services).

To be clear, the U.S. drug supply chain involves additional stakeholders, such as physicians who prescribe medications, patients, research institutions, pharmacy benefit managers (PBMs), health insurers, plan sponsors, and others; however, in order to understand how hundreds of billions of dollars are spent annually on prescription drugs, we need to focus on how the consumer prescription drug transaction actually functions.

Prescription Drug Contracting

Prescription drug insurance (i.e., pharmacy benefits) is intended to help individuals and families afford the medications they need to prevent illness and treat disease. It does so by offering financial assistance for the cost of medications, generally as part of a broader package of health insurance benefits (i.e., medical coverage). It is estimated that greater than 80% of Americans have prescription drug coverage, either through an employer-sponsored health plan, government plan, or shopping the individual marketplace of health plans. (11)

Under the law, insurance companies and group health plans will provide beneficiaries with a concise document, called the Summary of Benefits and Coverage, that details, in plain language, information about health plan benefits and coverage. (12) Because there is no universal form of healthcare in the U.S., health insurance coverage is highly individualized and ultimately directed and determined by contracts. This approach to healthcare helps explain why the same set of services can be expensive to one individual and more affordable to another – simply put, an individual's health insurance coverage entitles them to different levels of financial assistance for covered healthcare services. While this overview is true for U.S. healthcare broadly, it is certainly true for prescription drugs. The coverage an individual has

for prescription drugs, including the costs they pay, are ultimately determined by contracts. This includes the aforementioned contract between the patient and their health plan (generally through their employer), but also includes the contract between the health plan and the PBM and the contract between the PBM and pharmacy providers.

Patient to Health Plan Contracts

According to Kaiser Family Foundation, the majority of Americans contract for health insurance (and prescription drug coverage) through their job in what is typically referred to as employer sponsored healthcare coverage. (5) Beyond the wage an employee receives for their job, most employers also pre-negotiate healthcare coverage that their employees can purchase through their job as a benefit (hence this form of insurance is also referred to as group health insurance). From one employer to the next, each may offer differing levels of financial assistance for healthcare, and the benefit package ultimately offered from employers can provide competitive advantages to employers when competing for labor. At the same time, employer-sponsored healthcare coverage means that the average consumer has little insight into the process of negotiating a healthcare benefit package.

Although there are many ways by which healthcare benefits can be handled (HMOs, PPOs, EPOs, etc.), surveys indicate that most employees have limited options within their employer regarding which plans are available for them to sign up for (e.g. 75% of firms offered only one option in 2022). (13) Furthermore, the high cost of healthcare generally discourages individuals from foregoing health insurance through their employer and just paying cash for healthcare goods and services.

At the same time, individuals in government-sponsored health plans, the largest of which are Medicare and Medicaid, often have greater choice in the types of health insurance available to them. For example, as of 2023, the average Medicare beneficiary had up to 43 Medicare Advantage plans or 24 stand-alone Medicare Part D plans to choose from in their specific area. (14) Similarly, many state Medicaid programs require qualified individuals to elect from one of several Managed Care Organizations (MCOs) for their health insurance coverage.

Unsurprisingly, many individuals find the process of selecting coverage confusing and frustrating. It can be difficult to compare plans, particularly when individuals report feeling underqualified to evaluate their plan choices and do not fully understand the terms and conditions of the policy. (15) Furthermore, life is unpredictable. The coverage limits selected at the start of the year may not ultimately align with an individual's healthcare needs during the year.

Regardless of how a person obtains coverage, none are going to directly negotiate the rate of prescription drug costs within their health plan. Rather, the health plan will have negotiated payment rates for drugs through contracting with a PBM.

Health Plan to PBM Contracts

When health plans provide drug coverage to their covered enrollees, they typically do so based upon a contract with PBMs. Specifically, health plans engage in a negotiation process to establish agreements that govern the management of prescription drug benefits for their members. The negotiated contract terms outline the responsibilities, and financial

arrangements between the health plan and the PBM, with the goal of ensuring efficient and cost-effective access to medications for plan members.

The contract between a health plan and a PBM is generally a voluminous document that discusses provisions such as the list of drugs members will have access to (the formulary), and under what set of circumstances they can obtain that access (the prior authorization criteria). In addition, the contract will outline requirements for network adequacy, or the idea that members will be generally able to access medications via conveniently located pharmacy providers. This in turn means that the PBM will be responsible for developing and maintaining a network of pharmacies that enrollees can present their drug insurance card at in order to get the financial benefit of their insurance.

Health plans and PBMs will ultimately agree to the benefit and cost management strategy of the negotiated drug coverage. This involves determining not only the health plan's cost for prescription medications, but also the member cost-sharing responsibilities such as copayments, coinsurance, and deductibles. Health plans need to understand their drug cost such that they can properly underwrite their insurance policies for sale to their customers (either individuals directly purchasing plans or employer groups) and ensure compliance with regulations that govern insurance offerings (such as compliance with Medical Loss Ratio [MLR]). In general, health plan costs for drugs are tied to drug pricing benchmarks of either the dispensing pharmacy (i.e., U&C) or the drug manufacturer (i.e., discount to AWP). In other words, the health plan pays the lower of what discount they secured through their leverage or the asking price of the pharmacy provider. Health plans and PBMs use these cost benchmarks to ultimately underwrite their insurance policies to ensure sufficient financial reserves exist to service enrollee health claims and support the business.

PBM to Pharmacy Provider Contracts

Before detailing drug pricing benchmarks, we need to briefly discuss how PBMs develop a pharmacy network. In order for prescription drug insurance to be of value, covered individuals need to be able to use their prescription drug benefits card in the places where they get their prescriptions filled – namely, pharmacies.

Pharmacy network contracting is a process through which PBMs negotiate agreements with pharmacies to establish which pharmacies will provide prescription medications to their plan members and under what terms. The main objectives of pharmacy network contracting are to ensure convenient access to medications for plan members while at the same time helping to lower drug costs. By establishing a network of pharmacies, insurance companies and PBMs aim to create a network of preferred providers with which they have negotiated pricing arrangements and other terms.

The key focal point for this paper is the idea of a negotiated price that is achieved between the PBM and the pharmacy provider. Pharmacy providers can, and do, sell medications to individuals without insurance. In general, the sale of a medication to an individual without insurance is done at the pharmacy's usual & customary (U&C) rate. The U&C rate, properly set, will cover the cost the pharmacy paid to acquire the medication from their wholesaler, the cost of labor to prepare the medication for the individual's prescription, and profit to sustain and grow the business.

In most situations, negotiated rates by PBMs are lower than the pharmacy's U&C rate. This is because in exchange for accepting lower payment, the PBM is able to direct their enrolled members to the pharmacy's business. Recall that eight out of every ten Americans have drug coverage. To forgo participation in PBM networks is to risk losing out on the overwhelming majority of a pharmacy's potential customer base. However, pharmacies obviously have concerns about what prices a third-party may choose to reimburse them for their products and services – especially larger PBMs that may represent a significant portion of their covered patient base. As a result, their pharmacy network contract with the PBM generally sets reimbursement terms in relation to prescription drug pricing benchmarks. Drug pricing benchmarks represent published prices for drugs based upon various attempts to contextualize aspects, including pricing behavior, of the U.S. prescription drug supply chain. Therefore, the pricing benchmark selected plays a key role in determining the finances of both the pharmacy provider, but also the insurer / PBM, which can also impact patient cost-sharing.

Drug Pricing Benchmarks

Many are surprised to learn that despite all the public fervor over the prices of medicines, there is no single price for prescription drugs. In order to bring a drug to market, a manufacturer will have statutory obligations to establish a multitude of drug prices. Depending on the way the drug is sold, this can include, but are not necessarily limited to, an Average Sales Price (ASP), an Average Manufacturer Price (AMP), a Wholesale Acquisition Cost (WAC), and an Average Wholesale Price (AWP) or Suggested Wholesale Price (SWP). From there, other drug supply chain participants may have obligations or contribute to other potential drug pricing benchmarks (such as the aforementioned U&C prices set by pharmacies). All told, there are more than a dozen ways to contextualize drug prices within our drug supply chain. Several of these benchmarks will be critical to this study, and so we briefly review each below.

Wholesale Acquisition Cost (WAC)

WAC is the list price that drug manufacturers make available to drug wholesalers. By definition, this price does not include discounts, rebates, or other reductions when published. Said differently, there are allowable retrospective price concessions that will reduce the net transaction price (the final price paid) paid by the drug wholesaler. We are confident in what WAC is supposed to represent within the drug supply chain, because the definition of WAC is defined in federal law [42 USC 1395w-3a(c)(6)(B)]. The federal definition removes ambiguity related to what this price should represent when published.

As part of the definition, we know that WAC does not reflect discounts, rebates, or other forms of price concessions for drugs. Most brand drug price concessions occur after the sale of the prescription and are between the PBM and manufacturer. This is the opposite for generic drugs, where most discounts occur before the retail sale of the drug and happen within the manufacturer-wholesaler-pharmacy relationship.[i] Because the discounting of drug prices for brand drugs is primarily recognized retrospectively and with the PBM (as opposed to the

[i] Note that either the PBM or wholesaler may secure discounts from manufacturers through Group Purchasing Organizations (GPOs).

wholesaler), the WAC price may provide a reasonable estimated retail pharmacy cost to acquire brand drugs, but it is not nearly as reliable for generics.

To get a better understanding, you may think of the brand drug rebate structure somewhat like a mail-in rebate for consumer goods. For example, imagine your washing machine breaks. Fortunately, a prominent machine manufacturer just sent you, a loyal customer, a $200 mail-in rebate for their washing machines. You go to the store, do the math, and determine that even though the manufacturer's washing machines are not on sale and the retail price is more than other brands, the $200 rebate would result in the lowest net price. You purchase the manufacturer's washing machine for the full price, send in the rebate, and in three months, a check from the manufacturer arrives for $200, lowering your net price purchase price.

Consider the following observations. In the example, the retailer most likely purchased the manufacturer washer at or near the wholesale price and therefore did not offer a sale price. Another retailer's price for the same manufacturer's washer was similar (within 1-2%), as the manufacturer did not significantly discount the wholesaler price to any retailer (as they may face legal obligations to price products similarly). (16) Ultimately, the dynamic largely mimics the market for the price in which retail pharmacies acquire brand drugs.

You, the purchaser in our washing machine example, paid the full price upfront. Anyone who saw you walking out of the store that day assumed you paid full retail price for the appliance. The person ahead of you in line may have purchased the same washing machine without the rebate and paid the full retail price. Likewise, the individual behind you may have a different rebate worth $300, resulting in an even lower net price for the same washing machine. From an outsider's perspective, the only known price for each transaction was the customer's price at the counter, which is generally based on some mark-up to the wholesale price the retailer paid when acquiring the drug. Yet, in this set-up, different consumers paid different net prices. The customer who did not have access to a rebate (you may think of them as a cash-paying customer at the pharmacy) paid a significantly higher price than anyone else, and even those with rebates had their prices differentiated (potentially representing different payers and their different access to rebates, since customers generally don't get drug rebates themselves). Of course, unlike name brand products, most store brands (i.e., generics) do not offer rebates (a concept similar to what we know is going on with generic drugs).

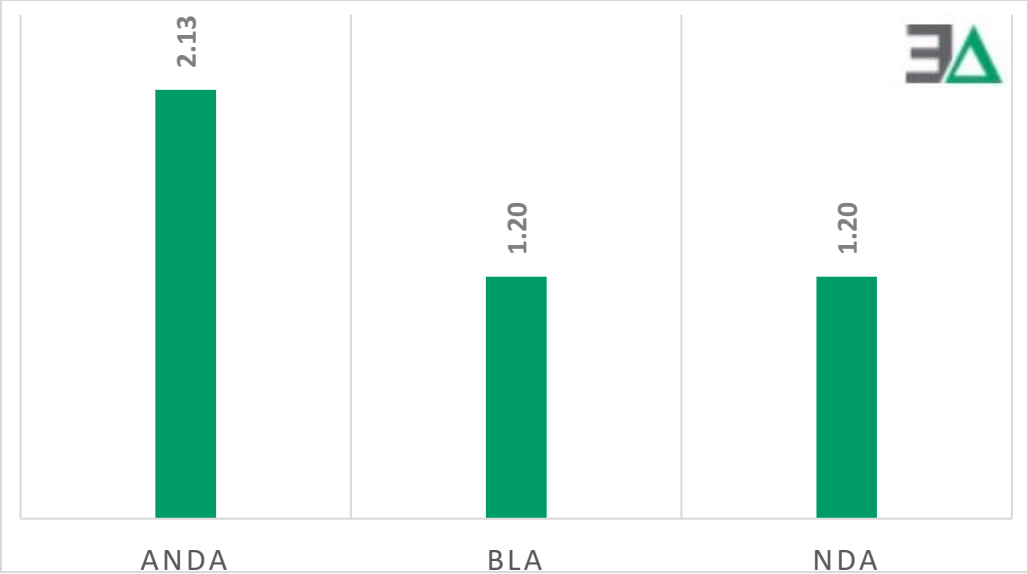
Now that we understand what WAC is, and how WAC can be used to give semi-reliable information related to brand drug purchases, but not necessarily generics, the question becomes what, if any, pricing benchmark would help us understand generic drug costs at a pharmacy.

Average Wholesale Price (AWP)

Returning to our washing machine example, when the manufacturer convinces a retailer to stock and sell their product, they generally provide a Manufacturer Suggested Retail Price (MSRP) to facilitate the retailer making money off the sale of their product. The greater the gap between the wholesale cost and MSRP "sticker price," the greater opportunity for a retailer to profit. Prescription drugs also have a "sticker price" that is above the actual cost to acquire, and that enables the supply chain to make money. This "sticker price" is known as AWP, which unlike the prior pricing benchmarks of WAC, AWP has no federal statute that can reliably

inform us what AWP is supposed to represent. As a result, AWP can be many times greater than any other drug pricing benchmark. For example, consider the following data (**Figure 2** below), which identifies the typical relationship between a prescription drug's AWP as a multiple of its WAC price based on the license type granted for medications entering the market. *Note: the U.S. Food and Drug Administration approves drugs on the basis of submitted New Drug Applications (NDAs), Biologic License Applications (BLAs) or Abbreviated New Drug Applications (ANDAs).*

Figure 2: Median AWP to WAC Ratio based on FDA Application Type, 2023[ii]



Regardless of how a drug comes to market, the AWP is generally 20% or more of the underlying WAC. Because of the lack of federal statute regulating AWP, our understanding of what AWP is and represents is informed primarily from suppliers of prescription benchmark pricing data. The most common suppliers of prescription drug pricing benchmark data, (i.e., WAC, AWP, and others), are Medi-Span and First Databank.

AWP is also the oldest prescription drug pricing benchmark, having existed in some way, shape, or form since the 1960s (and arguably the beginning of prescription drug insurance as we know it today). (17) In no small part due to its origin as the oldest pricing benchmark, the contracts governing drug payment between health plans and PBMs − as well as PBM and pharmacy networks − are often based on AWP.

While the fact that contracts are using AWP − a benchmark known to effectively represent nothing in regard to the actual cost of a prescription medication − may surprise you, traditional PBMs attempt to overcome the unreliability of AWP not by abandoning the pricing benchmark, but rather, through discounting the AWP and/or creating upper limits on payments. Discounting is an approach to pricing where the AWP payment is discounted by a certain percentage. To be more specific, when health plans negotiate drug costs with PBMs, they do so in terms of a discount to AWP (often referred to as an "effective rate"). Similarly, when

[ii] Sourced: US Food and Drug Administration (FDA) and Medi-Span PriceRx

pharmacy network rates are determined, they're generally guaranteed in relation to a discount to AWP. The discount may be differentiated by type of drug (i.e., brand or generic) as well as trade classification (i.e., retail, mail, or specialty), but all are typically expressed in terms of a discount to AWP. (18) Upper payment limits take the form of maximum allowable cost (MAC) lists. Like AWP discounts, MAC lists may be negotiated by health plans and/or pharmacy networks as part of the PBM contracting process with either group.

Maximum Allowable Cost (MAC)

MAC pricing is a PBM-generated catalog that includes an upper limit for the listed drug products. In general, MAC lists are limited to competitive, multisource drugs (frequently referred to as generic drugs). Generic drugs are eligible to be assigned a MAC price by the PBM because of the potential for numerous manufacturers to compete to produce the product, with many different potential price points because of that competition. In simple terms, if there are multiple manufacturers making interchangeable versions of the same drug, the PBM is granted latitude to assign its own subjectively determined price (ostensibly based on lower cost versions of the available product) that will be used as the prevailing rate for all versions of the drug. In contrast, brand or other exclusive products lack the type of price competition yielded among interchangeable generic competitors, as there is only one manufacturer of the product. A MAC list sets a per unit price for a particular generic drug regardless of the WAC, or the AWP, or other pricing benchmarks. MAC lists are designed by the PBM through market research and are meant to encourage efficient pharmacy purchasing. (19) Note that MAC lists frequently lack a consistent, binding legal definition for how they are to be explicitly determined, nor are they generally published by drug reference file sources. A frequent criticism of MAC lists is that they are often not reflective of actual market conditions and therefore do not create incentives for efficient purchases. (20)

National Average Drug Acquisition Cost (NADAC)

The last published pricing benchmark we should understand before we begin our analysis is the National Average Drug Acquisition Cost (NADAC). NADAC is not a manufacturer-set price, as it is created via a survey of retail pharmacy invoice acquisition costs for medications. As a result, NADAC represents the average invoice cost a retail pharmacy pays to acquire a drug. NADAC was developed by the Centers for Medicare and Medicaid Services (CMS), "to provide a national reference file to assist State Medicaid programs in the pricing of Covered Outpatient Drug claims to reflect the Actual Acquisition Cost (AAC) of drugs." As such, NADAC's goal is to be the most comprehensive public measurement of market-based retail pharmacy acquisition costs available.

To be clear, NADAC pricing reflects some, but not all, discounts in pricing. We know this because much like WAC, NADAC has a statutory definition we can rely upon to understand what it is supposed to contextualize about the drug supply chain [42 USC 1396r-8(f)]. (21) As a result, we may compare a drug's NADAC to that same drug's WAC price to determine the percent discount off invoice a pharmacy pays to acquire a drug. A review of NADAC pricing over time (**Figure 3** on the next page) tells us that brand medications are typically acquired by pharmacies at a mean WAC discount of approximately 4.7% and median of 4%, whereas generic medications may be acquired at much greater discounts, exceeding mean and median AWP discounts of 40%.

Figure 3: NADAC Equivalency to Other Drug Pricing Benchmarks[iii]

Quarter Ending	Brand Legend Drugs				Generic Legend Drugs			
	WAC Mean	WAC Median	AWP Mean	AWP Median	WAC Mean	WAC Median	AWP Mean	AWP Median
March 2022	-4.6%	-4.0%	-20.6%	-20.0%	-44.2%	-49.5%	-80.9%	-88.7%
June 2022	-4.8%	-4.0%	-20.8%	-20.0%	-46.2%	-50.5%	-81.7%	-89.6%
September 2022	-4.7%	-4.0%	-20.7%	-20.0%	-47.1%	-51.3%	-82.7%	-90.2%
December 2022	-4.7%	-4.0%	-20.9%	-20.0%	-48.0%	-52.0%	-83.1%	-90.6%
March 2023	-4.9%	-4.0%	-20.9%	-20.0%	-47.7%	-51.9%	-83.1%	-90.7%

Returning to our earlier washing machine example (see WAC and AWP sections above), this would be equivalent to identifying the actual invoice cost the retailer paid rather than relying upon the reported wholesale price for a washing machine. A 4% average discount would suggest that most retailers acquired a $500 wholesale priced washing machine at an invoice price of $480 dollars. In addition, we can appreciate that the $200 mail-in rebate represents a 40% discount to the product's wholesale price, while the $300 rebate represents a 60% discount to wholesale price.

Unlike brand drugs, much of the discounting for generic drugs that occurs between the wholesaler and manufacturer ends up reflected in pharmacies' cost to acquire (invoice or net cost). Returning to our prior Wholesale Acquisition Cost (WAC) section and **Figure 3** above, we understand that WAC, via its federal definition, reflects the wholesale list price between the generic drug manufacturer and the wholesaler. However, we can see that the wholesaler is making available to pharmacies 50% discounts to the WAC price for generic drugs. The wholesaler is likely not providing these discounts in a way that materially harms its finances, suggesting it is acquiring the generic products for greater than a 50% discount off WAC. Generic drugs often have multiple manufacturers, creating wholesale pricing competition. For this reason, generic manufacturers provide significant discounts on list price (WAC) to wholesalers to incentivize distributing their product over a competitor. Then, a portion of the drug's discounts are reflected in the price the distributor uses to sell to their customers, such as retail pharmacies. This is because the competitor product can be made available to the pharmacy provider to purchase in other ways outside of the wholesaler who negotiated the price discount (such as selling directly to the pharmacy or via a secondary wholesaler). In general, the competition results in retail pharmacies acquiring generic drugs at discounts averaging 45% to 50% off WAC (as suggested by the NADAC pricing benchmark) but can be much higher or lower depending on the specific drug, market competition, and other forms of price concessions that exist within contracts between wholesalers and pharmacies (not discussed here).

Now that we have a better understanding of how pharmacies purchase products and the approximate prices they pay to purchase them (i.e., WAC for brands and NADAC for generics), we need to understand how pharmacies sell products. As stated, most pharmacies sell products to individuals with prescription drug insurance, and the majority of insurance claims are not basing the price of the drug off of WAC or NADAC, but rather off of a third pricing benchmark known as Average Wholesale Price (AWP).

[iii] Source: Myers and Stauffer, LC via Medicaid.gov

Negotiated Price and Pharmacy Claims

For claims to be paid, as described above, there must be a contract between the PBM and the pharmacy that details drug payment terms. For prescription benefits to have value to consumers at the local level, consumers must be able to present their pharmacy benefit card at pharmacies in close proximity to their location. The availability of pharmacy providers and the desire for lower negotiated rates creates competitive forces within the pharmacy network contract. (22)

PBMs establish a network of pharmacies for consumers to use by contracting either directly with individual pharmacies (often referred to as direct contracts) or in group contract arrangements. Large chain pharmacies have many pharmacy locations and often contract in a chain/group arrangement, utilizing their multiple locations as leverage to negotiate reimbursement terms and gain access into PBM networks. Smaller pharmacies may not be attractive enough to PBMs for inclusion into the network on an individual, direct basis. Rather, smaller pharmacies often achieve access to PBM network contracts through a Pharmacy Services Administrative Organization (PSAO). The PSAO allows smaller pharmacies to be part of a larger collection of pharmacies to gain access to the PBM networks. In addition, a PSAO removes much of the administrative burden associated with contracting. (23) Moving forward in this report, when we refer to a pharmacy network from the pharmacy provider point of view, we are referring to PSAO/chain contracting group arrangements.

A PBM's negotiated price is the contractual price for which a PBM and pharmacy (or pharmacy network) has agreed upon for a particular transaction. And while that definition is relatively simple on paper, it is a fairly complex process. A transaction occurs when a pharmacy submits an electronic claim for payment for a particular product, service, or combination of both. At the most basic level, the transaction is comprised of payment for product (ingredient cost), a fee to cover overhead associated with the dispensing of the product (dispensing fee), and an additional optional payment (incentive amount) if the pharmacy performed a service beyond dispensing, such as administering a vaccine.

The National Council for Prescription Drug Programs (NCPDP) governs the standard for pharmacy claims transactions between pharmacy providers and third-party payers (i.e., PBMs). This ensures that all payers and pharmacies utilize a uniform data schema. The formula for calculating total amount paid for any given transaction is as follows (24):

Total Amount Paid (NCDPD Field# 509-F9) = Ingredient Cost Paid (NCPDP Field# 506-F6)
+ Dispensing Fee Paid (NCPDP Field# 507-F7)
+ Incentive Amount Paid (NCPDP Field# 521-FL)
+ Other Amount Paid (NCPDP Field# 565-J4)
+ Flat Sales Tax Amount Paid (NCPDP Field# 558-AW)
+ Percentage Sales Tax Amount Paid (NCPDP Field # 559-AX)
- Patient Pay Amount (NCPDP Field # 505-F5)
- Other Payer Amount Recognized (NCPDP Field # 566-J5)

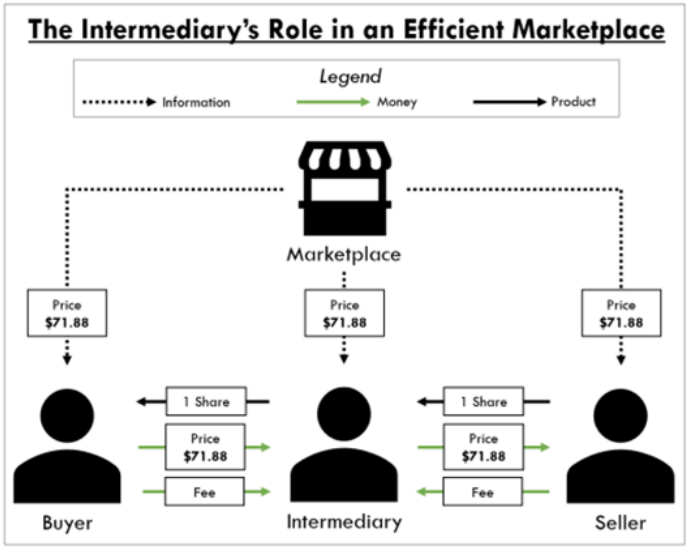
Source: National Council of Prescription Drug Programs (NCPDP) Telecommunication Standards D.0

A successful paid transaction results in the pharmacy receiving payment from the PBM at the negotiated rate for the claim (inclusive of an ingredient cost paid plus payment in any of the

other fields per the contract). The PBM's client will then receive a bill for the transaction. Like many other drug supply chain participants, PBMs can benefit when everyone receives a different price. For example, the PBM may pay a provider one price and then bill a client a higher price, creating what's typically referred to as a "spread." In this scenario, the PBM not only facilitates the transaction, but also is afforded the opaque ability to set different prices at either end of the transaction, creating a gap within the transaction that can generate profit for the PBM without disclosure to the plan sponsor.

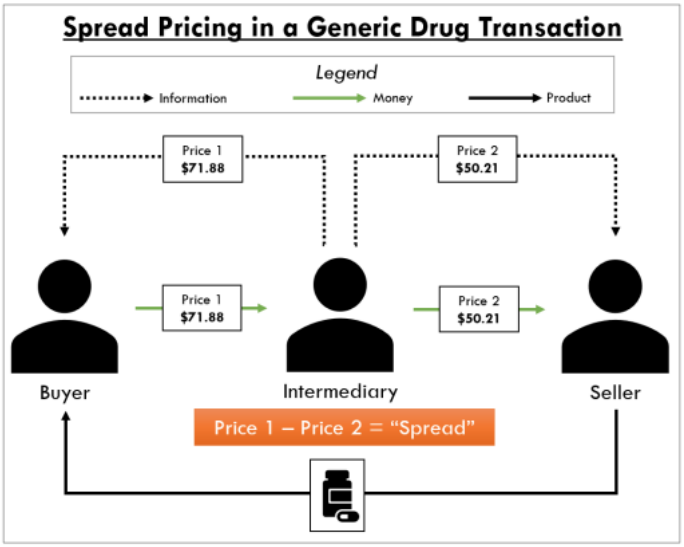
To contextualize, we may turn to the stock market. Take for example a brokerage firm providing a service in which a seller of a stock may list a security for a particular price, say $100, and a buyer may purchase the security at that price. To facilitate the transaction, the brokerage firm may charge a small fee, say $1, known by all parties. There are many buyers and sellers using the firm's platform, and all transactions are posted. In this scenario, everyone knows the price of the stock, as well as the brokerage's transaction fee. The prices are transparent and determined directly between the buyer and seller as the firm facilitates the transaction (**Figure 4**).

Figure 4: Role of Intermediary in an Efficient Marketplace



Now consider the opposite (**Figure 5** on the next page), in which the seller does not list the price of the security but instead the brokerage firm negotiates all transactions privately with buyers. Despite not assuming a fiduciary relationship with the buyer, the brokerage firm assures the seller that they will negotiate a great price. In private, the firm tells the buyer that the market price is $110 for the same security that sold above for $100. The buyer has no way have knowing the true market-clearing rate for the security, as those prices are not transparent, meaning the buyer must take the brokerage firm's word. The firm then goes back to the seller and informs them that the security sold for $90. So, the buyer is unaware that the broker obtained the security for $90 and charged them $110, and the seller is unaware that the broker sold the security for $110 despite acquiring it for $90. The $20 gap is unknown to either end of the transaction, allowing the broker to maximize returns through pushing both ends further apart.

Figure 5: Overview of Spread Pricing Process



In the scenario of **Figure 5**, the buy and sell price was established entirely by the facilitator, who gets to arbitrage the arrangement (that is, set different prices between buyer and seller). As we move forward and discuss factors that influence a drug's price, it is beneficial to consider how various payment arrangements positively or negatively impact various stakeholders in the drug channel, such as the manufacturers, wholesalers, pharmacies, beneficiaries, purchasers of prescription drugs lacking drug insurance, PBMs, and plan sponsors. As in the stock market example, we will need to ensure an understanding of the component costs that determine the drug price for any given transaction.

Ingredient Cost Paid

The ingredient cost paid component (NCPDP Field# 506-F6) of pharmacy reimbursement represents the price reimbursed by PBMs to the pharmacy for the drug product dispensed. The ingredient cost reimbursed at the point-of-sale (POS) is determined by the contract between the PBM and/or pharmacy (whether that contract was directly negotiated by the pharmacy or as part of a broader network contract the pharmacy is participating within). As already stated, retail drug pricing is complex due to the variety of pricing benchmarks (i.e., NADAC, MAC, AWP, WAC, AAC, etc.) which could be used as the basis to pay and bill claims. However, complexity is increased when we recognize that the basis of paying a pharmacy for their dispensed drugs can be further contextualized by no less than 19 unique values, which may be provided in a claim response to designate why a particular calculation was utilized to determine a drug's cost. In the NCPDP telecommunication standards shown in **Figure 6** (on the next page), you can see that the PBM can indicate that the claim was paid in more than a dozen different ways. Said differently, there is a lot of allowable variability in the methods used to assign a price to a drug beyond the price originally set by the manufacturer.

Figure 6: Basis of Reimbursement Determination[iv]

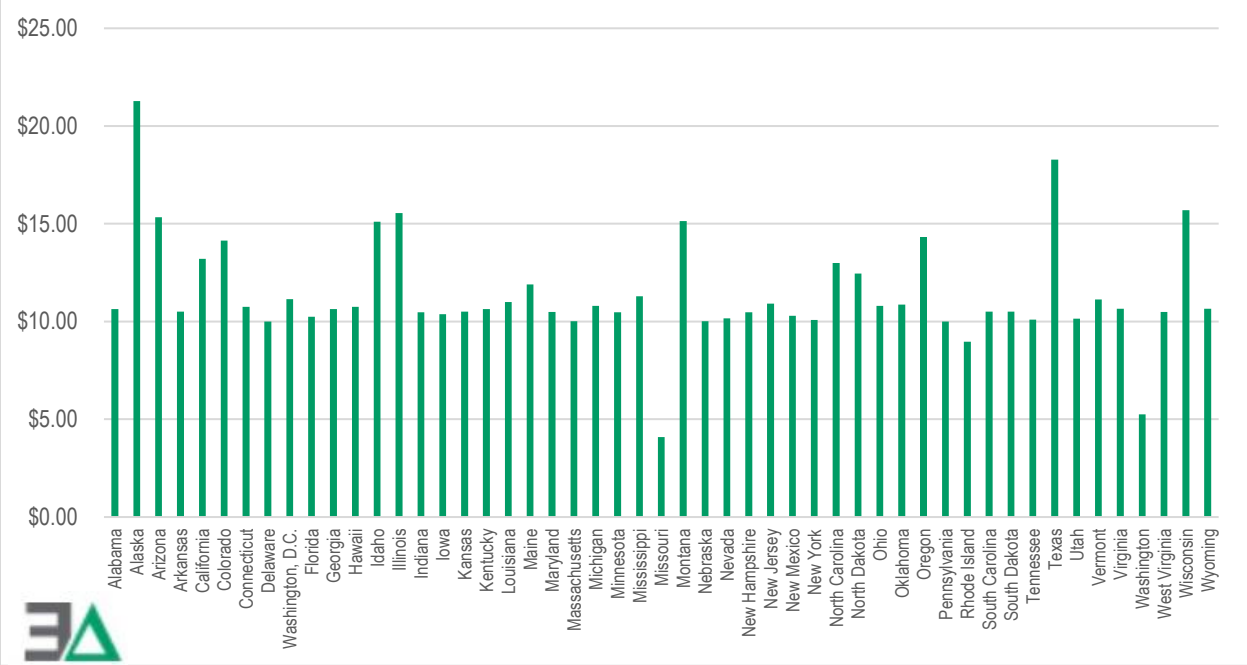
Code / Value	Meaning	Meaning Definition Text
0	Not Specified	*Not Provided*
1	Used to indicate when reimbursement is equal to the amount billed by the provider for the prescription item.	Used to indicate when reimbursement is equal to the amount billed by the provider for the prescription item.
2	Used to indicate when reimbursement is based upon the average wholesale price for the prescription item.	Used to indicate when reimbursement is based upon the average wholesale price for the prescription item.
3	Used to indicate when reimbursement is based on a discounted average wholesale price for the prescription item.	Used to indicate when reimbursement is based on a discounted average wholesale price for the prescription item.
4	Indicates when the ingredient cost reimbursed to the provider is based upon the submitted Usual and Customary Price.	Indicates when the ingredient cost reimbursed to the provider is based upon the submitted Usual and Customary Price.
5	Used to indicate that the processor has compared submitted U&C to the cost plus the fee (May be either their negotiated value for cost plus fee, or the submitted cost and fee), and is paying the lower of the amounts.	Used to indicate that the processor has compared submitted U&C to the cost plus the fee (May be either their negotiated value for cost plus fee, or the submitted cost and fee), and is paying the lower of the amounts.
6	Indicates when the ingredient cost reimbursed to the provider is based upon a payer's Maximum Allowable Cost list. (when MAC Basis of Cost was submitted)	Indicates when the ingredient cost reimbursed to the provider is based upon a payer's Maximum Allowable Cost list. (when MAC Basis of Cost was submitted)
7	Indicates when the ingredient cost reimbursed to the provider is based upon a payer's Maximum Allowable Cost list. (when other than MAC Basis of Cost was submitted)	Indicates when the ingredient cost reimbursed to the provider is based upon a payer's Maximum Allowable Cost list. (when other than MAC Basis of Cost was submitted)
8	Price based upon contractual agreement between trading partners.	Price based upon contractual agreement between trading partners.
9	Used to indicate when reimbursement is based upon the actual cost of the item.	Used to indicate when reimbursement is based upon the actual cost of the item.
10	The average sales price (ASP) is a cost basis required by and reported to CMS for pricing Medicare Part B drugs.	The average sales price (ASP) is a cost basis required by and reported to CMS for pricing Medicare Part B drugs.
11	The average price paid to manufacturers by wholesalers for drugs distributed to the retail class of trade; calculated net of chargebacks, discounts, rebates, and other benefits tied to the purchase of the drug product, regardless of whether these incentives are paid to the wholesaler or the retailer.	The average price paid to manufacturers by wholesalers for drugs distributed to the retail class of trade; calculated net of chargebacks, discounts, rebates, and other benefits tied to the purchase of the drug product, regardless of whether these incentives are paid to the wholesaler or the retailer.
12	Price available under Section 340B of the Public Health Service Act of 1992 including sub-ceiling purchases authorized by Section 340B (a)(10) and those made through the Prime Vendor Program (Section 340B(a)(8)). Applicable only to submissions to fee for service Medicaid programs when required by law or regulation.	Price available under Section 340B of the Public Health Service Act of 1992 including sub-ceiling purchases authorized by Section 340B (a)(10) and those made through the Prime Vendor Program (Section 340B(a)(8)). Applicable only to submissions to fee for service Medicaid programs when required by law or regulation.
13	A cost as defined in Title XIX, Section 1927 of the Social Security Act.	A cost as defined in Title XIX, Section 1927 of the Social Security Act.
14	Indicates reimbursement was based on the Other Payer-Patient Responsibility Amount (352-NQ).	Indicates reimbursement was based on the Other Payer-Patient Responsibility Amount (352-NQ).
15	Indicates reimbursement was based on the Patient Pay Amount (505-F5).	Indicates reimbursement was based on the Patient Pay Amount (505-F5).
16	Indicates reimbursement was based on the Coupon Value Amount (487-NE) submitted or coupon amount determined by the processor.	Indicates reimbursement was based on the Coupon Value Amount (487-NE) submitted or coupon amount determined by the processor.
17	Indicates the reimbursement was based on the cost calculated by the pharmacy for the drug for this special patient.	Indicates the reimbursement was based on the cost calculated by the pharmacy for the drug for this special patient.
18	Represents the manufacturer's published catalog or list price for a drug product to non-wholesalers. Direct Price does not represent actual transaction prices and does not include prompt pay or other discounts, rebates or reductions.	Represents the manufacturer's published catalog or list price for a drug product to non-wholesalers. Direct Price does not represent actual transaction prices and does not include prompt pay or other discounts, rebates or reductions.
19	State mandated level of reimbursement for Workers' Compensation or Property and Casualty prescription services.	State mandated level of reimbursement for Workers' Compensation or Property and Casualty prescription services.

Dispensing Fees

A dispensing fee is also a component of the total amount paid for prescription medications. A dispensing fee is meant to cover pharmacy overhead costs associated with filling a prescription and is separate from the drug ingredient payment. Overhead includes but is not limited to payroll costs, time necessary to perform drug utilization review (DUR), prescription department cost (i.e., prescription containers, insurance, licenses, technology fees, and transaction fees), facility costs (i.e., rent, utilities, maintenance), and technology fees (i.e., software, electronic submission charges). Recent research from the National Association of Chain Drug Stores (NACDS) estimates the average retail pharmacy cost to dispense at roughly $12.40 (for non-specialty drugs). (25) Previous analysis by 3 Axis Advisors suggests state-run fee-for-service (FFS) Medicaid systems' dispensing fees – which are required by the federal government to accurately approximate pharmacy cost of dispensing – generally range from and average between $10 and $12 per prescription with the mean in 2020 being approximately $11 (**Figure 7** on next page). (26) (27)

[iv] Source: National Council of Prescription Drug Programs (NCPDP) Telecommunication Standards D.0

Figure 7: Overview of Individual State Medicaid Pharmacy Dispensing Fees[v]



The Makeup of the U.S. Drug Insurance Marketplace

The variability in prescription drug contracting and pricing benchmarks can be attributed, in part, to the segmented nature of prescription drug insurance in the U.S. There is no single, universal source of prescription drug insurance and so drug pricing analyses are generally distinguished by the source of drug insurance funding. The most common designations are commercial insurance (i.e., employer-sponsored health plans), Medicare benefits (benefits available to individuals over the age of 65 funded through payroll taxes), and Medicaid benefits (entitlement benefits based on means-testing, jointly funded between state and federal taxes). As already identified, PBMs support the various sources of prescription drug insurance in providing patients with access to their drug insurance benefit (regardless of the source).

The PBM market is highly consolidated, with the largest PBMs having near total market share. According to data compiled by Drug Channels Institute, the top six PBMs in 2022 accounted for 96% of all pharmacy claims dispensed. (28) As we begin our study of retail pharmacy reimbursement data, we wanted to first analyze the role of market segmentation within our studied pharmacy data set.

We began our analysis by segmenting the data in terms of PBMs and line of business to visualize the distribution of data. Pharmacy data makes it relatively easier to identify PBMs, based on the billing standards of the National Council of Prescription Drug Programs (NCPDP). Despite PBM consolidation, the Pharmaceutical Care Management Association (PCMA) reports that there are more than 70 PBMs in operation at present, meaning that any effort to display all unique results would result in visualizations that would be difficult to interpret. (29) Therefore,

[v] Source: Medicaid Covered Outpatient Prescription Drug Reimbursement Information by State, Quarter Ending June 2022

in reference to the consolidation of the largest PBMs, we will limit our analysis to the top three identified PBMs within the claims data (identified as Payers A, B, and C) and group all others into a combined group (identified as Other). From there, we identified transactions from our 32.6 million retail pharmacy claims from 2020 study sample under each payer as either being Medicare, Medicaid or Commercial claims. To do this, we relied upon the Medicare BIN and PCN assignments to identify Medicare claims, the payer sheets and provider manuals for the various PBMs to identify Medicaid claims, and finally assigned all other claims that were not Medicare and Medicaid as Commercial claims. (30)

To help familiarize readers with our studied pharmacy data set from 2020, our first set of visualizations of the data display the distribution of claims between the identified PBMs, the various payer types, and the proportion of drug costs paid for by the plan sponsor and the patient. We display the results in Sankey charts by brand (**Figure 8** below) and generic product (**Figure 9** below) types. Sankey charts are used to visualize the flow of data, allowing for identification in relationships that may exist among groupings.

Figure 8: Brand Claims by PBM, Payer, and Member Cost Exposure, Studied Pharmacy Data (2020)

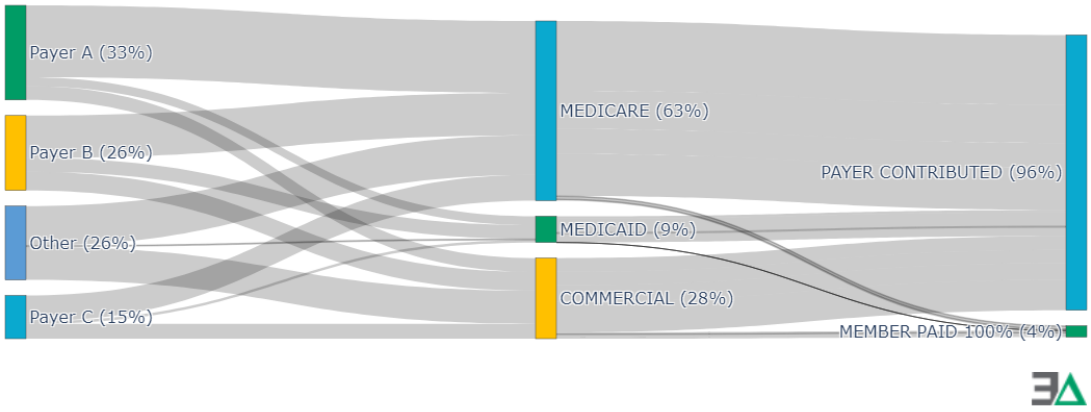
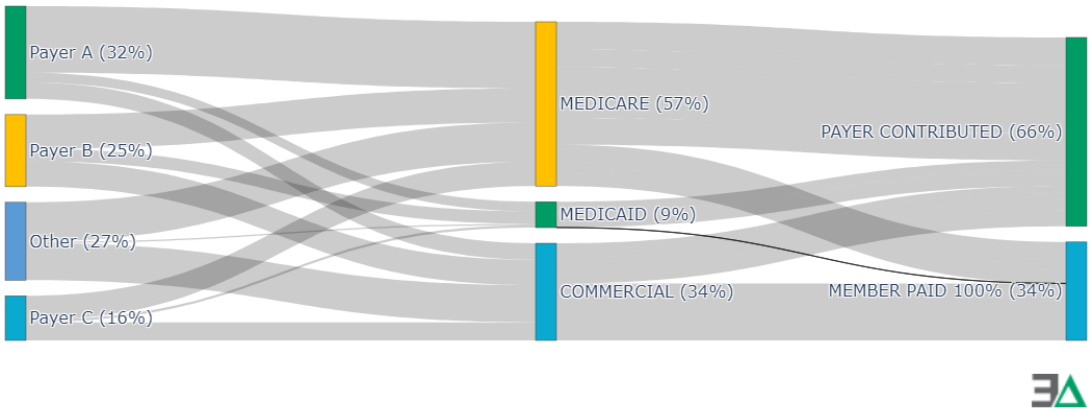


Figure 9: Generic Claims by PBM, Payer, and Member Cost Exposure, Studied Pharmacy Data (2020)



We believe that this background provides sufficient information to begin our analysis of the origin of drug prices at retail community pharmacies in the U.S.

Origin of Drug Prices at Retail Community Pharmacies in the U.S.

Prescription drugs are in many ways the backbone of U.S. healthcare system. Whether a person is seeking treatment for a simple infection or complex disease state like cancer or multiple sclerosis, prescription drugs are the primary tools employed by our nation's healthcare professionals (or the goal of researchers who are looking to offer solutions for conditions without current treatments). The importance of medications can perhaps be better understood with an example. High cholesterol affects two in five Americans, increasing the risk of heart disease or stroke if left untreated. (31) Generic drugs have made the management and treatment of high cholesterol effective and affordable for most. The generic version of Lipitor® 40 mg, which is atorvastatin 40 mg, lowers cholesterol by nearly 50% at an estimated provider invoice cost around $0.10 per day (per NADAC). (32) The low cost would suggest even the indigent should have minimal problem accessing the drug at a retail price that would be affordable. And yet, research suggests that adherence to statin medications like atorvastatin is often less than 50%. (33) While there are many reasons for nonadherence to drug therapies, the most commonly cited reason by patients is often drug costs. (34)

And when it comes to drug prices, the commonly held belief is that pharmaceutical companies alone set and raise drug prices. (35) However, prices for atorvastatin are routinely more varied than manufacturer-set drug prices would suggest. As of June 2023, there were 45 different companies selling versions of generic Lipitor® based on the product's registration with the U.S. Food and Drug Administration (FDA).[vi] (36) These different suppliers set 20 unique WAC prices, ranging from $0.05 to $0.50 per unit. At the same time, there were also 35 different AWP values for their products (ranging from $0.07 to $35.50 per unit). Regardless of whether we consider WAC or AWP to be the manufacturer's set price point, the variability in this product's price should be no greater than 35 unique prices based on the prevailing understanding of drug prices. And yet, our 2022 report on pharmacy reimbursement trends in Oregon identified 110 different PBM prices for the same atorvastatin drug yielded at 86 Oregon retail pharmacies. The PBM-set prices for 30 tablets of atorvastatin ranged from a low of $0.30 to a high of $188.10 ($0.01 per unit to $6.27 per unit). As a result, our first analysis of our 2020 retail pharmacy claims for this study is to attempt to better identify the source of these kinds of drug pricing disparities at retail community pharmacies.

Removing Input Cost Variability in Analyzing Drug Prices

We began our analysis by attempting to remove all reasonable variables which may impact disparities in the setting of drug prices – specifically, the role of price competition between suppliers of prescription drugs. For the purposes of this analysis, the suppliers of prescription drugs are both the manufacturer and the dispensing pharmacy. For many pharmaceuticals, there are numerous suppliers whose competition with one another may influence price. For example, the generic drug market thrives on competition (see above count of companies producing generic Lipitor®). Many generic manufacturers produce different versions of the same generic drug, creating wholesale price competition. In most instances, the lower the price, the more incentives a pharmacy provider pharmacy may have to purchase one generic

[vi] Note that prescription drug manufacturers may not be equivalent to the drug's labeler. As a result, it is possible to have more variety in sources of acquiring a drug (i.e., labelers) than the unique number manufacturing the drug. To be more specific, a labeler may be either a manufacturer or the entity under whose own label or trade name the product will be distributed if the product is subject to a private labeling agreement.

manufacturer's version over another (consistent with most business' approach to managing sourcing costs). The lower provider acquisition price for a drug is intended in part to transfer to the pharmacy's retail price so consumers may share in the financial value generic drugs offer. Indeed, past investigations by the FDA have found significant erosion of generic drug prices relative to the brands that those generics aim to replace. (37) At the same time, there are approximately 60,000 retail pharmacies potentially competing for business. (38) In the face of such competition, both of these sources might reasonably explain drug pricing variability.

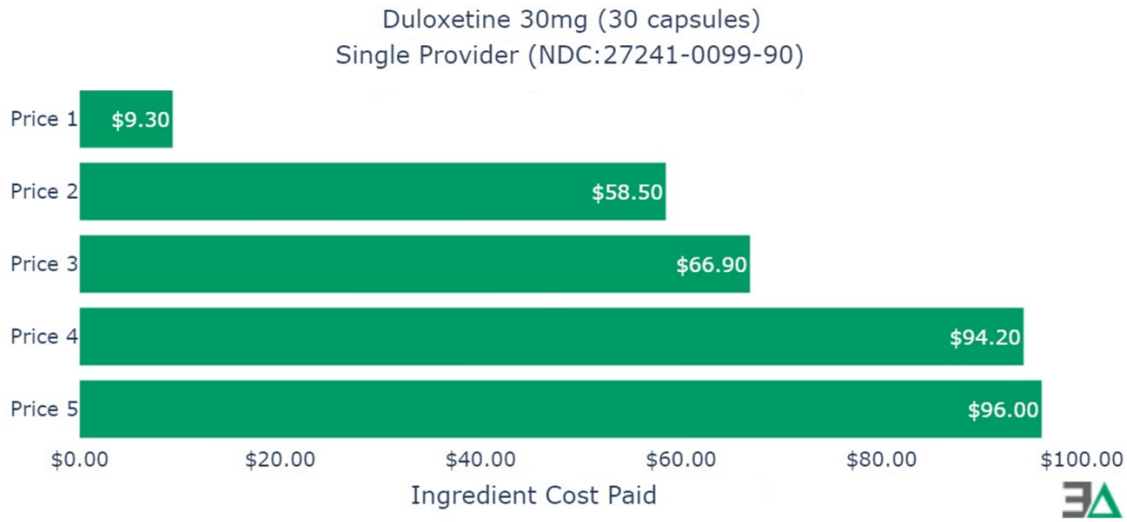
To remove the impact of price variability based on suppliers, we began our analysis by limiting prices to a singular product and provider viewpoint. If drug manufacturers were the sole cause of drug pricing disparity, then by limiting our price analysis to just those manufacturer prices at single pharmacy locations, we should be able to identify their role in drug prices effectively and efficiently (note we also limited prices to the same date, as drug prices do change over time [see **Methodology**]). Said differently, we wanted to design a database that would enable us to look at all prices for a single product (i.e., atorvastatin [generic Lipitor]) and see that the only factor that influenced the point-of-sale price was the sourced NDC (i.e., the manufacturer) and not the dispensing pharmacy provider.

However, after constructing this database, we were unable to identify a singular point-of-sale price for any product. Said differently, **it was impossible for us to analyze a database where the prices for a given product, at a given pharmacy location, on a given day, were universally the same**.

For example, one of the datapoints we encountered was for the product duloxetine 30 mg, where a single pharmacy, on a single day, for a single duloxetine product (on an NDC basis), at the same quantity, was paid anywhere from $9.30 to $96.00 by the same payer (namely, the largest PBM in our study). The pharmacy was paid a different price for this product 70% of the time, yielding five different prices from the same PBM on this single day. In other words, the variability in this drug price cannot be reasonably attributed to the action of the manufacturer. Instead, when the same PBM paid the same provider on the same day for the same product, they created five different prices with the range of pricing variance being more than $85 per prescription.

Regardless of which price we use to reflect the manufacturer's price (AWP or WAC), there was only one set of prices that the manufacturer provided to the market on this day. At the same time, the other supplier, the pharmacy, also cannot reasonably account for the differences in this drug's pricing behavior. This pharmacy had only one acquisition price for this product on this day (i.e., the price they paid to acquire the NDC), and yet, some prescriptions were clearly more profitable than others (given the 10-fold difference in price from low to high). Similarly, the pharmacy was only setting and charging one U&C price for the product on this day. As such, the prices yielded by the PBM at the pharmacy counter – the amounts that determine the pharmacy's financial fate in the transaction and the amounts that can determine what a patient or plan sponsor is charged by their PBM for that same transaction – could have more than $1,000 in annualized impact for just this one drug from the lowest to the highest price points set by the same PBM company (see **Figure 10** on the next page).

Figure 10: Same Provider, PBM and Day Analysis on Duloxetine 30 mg Pricing



Exploring the Role of Pharmacy Benefit Managers on Drug Prices

We began our discussion of drug pricing data with an overview of the various price points experienced at one provider, for one product, because such transactional activity is likely not routinely experienced by most U.S. consumers in other marketplaces. Consider if the same pricing logic (10-fold difference in the sale price of duloxetine, as seen in **Figure 10**) was applied to a gallon of milk. Translating our duloxetine example into milk prices, you could imagine the public uproar if the same brand of milk to be purchased by some consumers at the same grocery store on the same day for as low as $3.99 or as high as $39.90 (10x difference) with many different prices in between.

To build on the duloxetine example, we expanded the analysis to our broader 1,200+ study pharmacies and found 172 providers who also dispensed the previously identified national drug code (NDC) for duloxetine on the same day, through the same PBM. By expanding this analysis to all pharmacies whose data we're reviewing, but keeping the NDC unchanged, we're introducing the potential confounding variable of differential provider operating costs into our analysis (which was controlled before through limiting the analysis to a single pharmacy). Again, the prevailing axiom is that drug manufacturers alone are responsible for setting drug prices, and so it should not matter if we introduced pharmacy provider variability into this equation (as again, they're not generally understood to be the cause of drug price variability). Ultimately, this database gives us the ability to check if the same PBM chose to price the same drug, made by the same manufacturer, dispensed on the same day was consistent from prescription-to-prescription across the many pharmacies who might dispense that drug. Unsurprisingly, based on our earlier finding, we did not find consistency in drug prices set by the PBM intermediaries across the spectrum of pharmacies. In fact, we found that this single PBM set a total of 49 different prices on 232 prescriptions paid for on the same day for the exact same drug. The pricing differentials are detailed in the bar chart below (**Figure 11** on the next page).

Figure 11: Pricing Variability Analysis for Same Drug, Same Day, Same PBM, but Different Providers, Duloxetine 30 mg[vii]

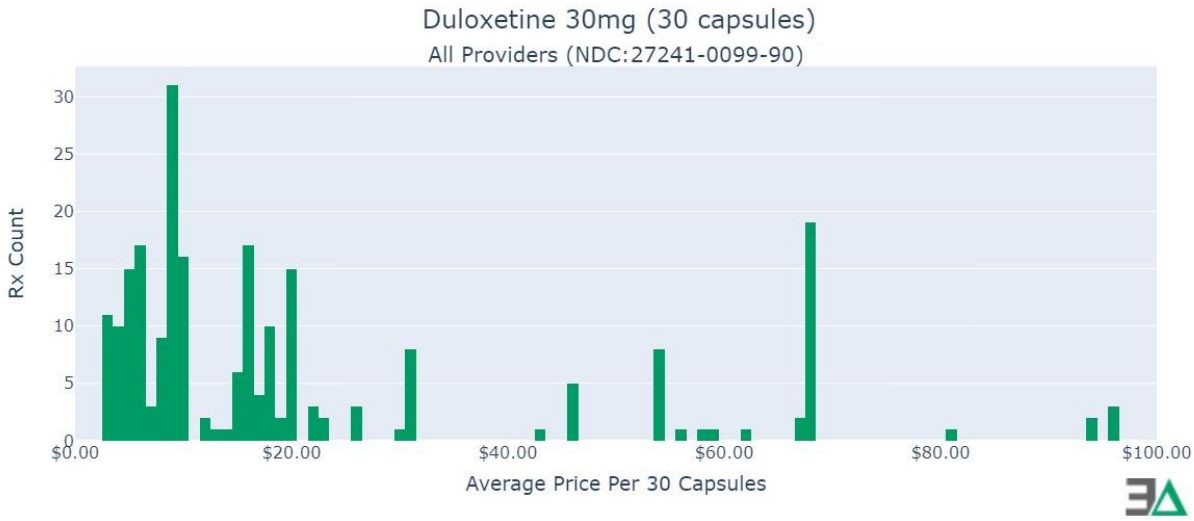


Figure 11 shows that the same PBM set 49 unique prices for duloxetine across the 232 claims filled by the 172 pharmacy providers with around $90 difference between the lowest and highest rates. Based on our preliminary analysis, there is clearly more impact to a drug's price than the price point(s) established by drugmakers. To be clear, on this day, the manufacturer of this NDC had established only one value for their WAC and AWP.[viii] However, to further explore drug prices, we will need to better understand the reported basis of retail drug costs.

Basis of Retail Drug Costs

The U.S. prescription drug market supports a number of pricing benchmarks which can be used to contextualize drug pricing. While the introduction to this paper discussed a few (i.e., WAC, AWP, MAC, & NADAC), more than a dozen benchmarks exist in practice. Consequently, the methodologies one could derive to pay for prescription medications off these benchmarks would be at least as varied as the number of benchmarks that exist. Said differently, we have already established that there is potentially more than one way to contextualize a drug manufacturer's set price (i.e., WAC or AWP); however, it must be understood that one or more of these or other benchmarks might ultimately be used as the basis to actually pay for a prescription drug at a pharmacy counter (otherwise how else could we explain the various observations in the previous section?). As we are fond of saying, context is everything when it comes to any focus on drug prices.

Fortunately, pharmacy claims are governed by a universal set of claim standards. This in turn means we can rely upon these standards to better contextualize the origin of drug prices in the retail pharmacy setting. According to the National Council of Prescription Drug Programs (NCPDP) standards for pharmacy claims transactions, Field# 522-FM represents the *Basis of Reimbursement Determination*. In other words, when a pharmacy submits a claim to a person's

[vii] Note that we had to normalize fills to 30 days as not all prescriptions across the 172 providers were dispensed for 30-day supplies.

[viii] In making the statement regarding origin of WAC and AWP, we are relying upon the pricing source published within Medi-Span (i.e., the AWP was not a derived value according to Medi-Span's pricing policies).

insurance, this field can reliably tell the pharmacy how the drug's reimbursement method was determined by the PBM.

To be clear, pharmacies receive reimbursement beyond the ingredient cost (flagged in data as 'ingredient cost paid'). More specifically, pharmacies may also receive a dispensing fee for the drugs they dispense.[ix] Taken together, the ingredient cost plus dispensing fee represents the total amount paid on the claim to the pharmacy. The cost of both the drug ingredient and dispensing fee are generally split for people with insurance. Namely, patients pay a certain amount towards the total claim cost (known as 'patient pay amount', also a field within the universal standard) with the remainder being paid for by the person's insurance.

Dispensing Fee Role in Retail Pharmacy Drug Costs

We are beginning our discussion on retail pharmacy drug costs with a focus on drug ingredient cost payments (and their basis of reimbursement) because drug ingredient costs are where the majority of claim costs are incurred. On its face, ingredient costs are intended to cover the cost of the drug being sold, whereas dispensing fees are designed to cover provider overhead costs (i.e., staff, facility expenditures, packaging, and labeling of a prescription). The alternative to such an arrangement (where ingredient costs cover drug acquisition and dispensing fees cover pharmacy overhead), is that drug costs would need to be inflated (i.e., intentionally designed to not approximate the actual cost of the drug) in order to support pharmacy operations or conversely, dispensing fees would need to be inflated (i.e., intentionally designed to not approximate the actual cost of pharmacy overhead). A business cannot survive if its only revenue stream is compensation for the underlying cost of goods sold (which in our example would be payment just for the drug's [ingredient] costs) without any allowance for overhead costs. However, this philosophical approach seems to be the predominant manner by which drug costs are handled in retail community pharmacies today.

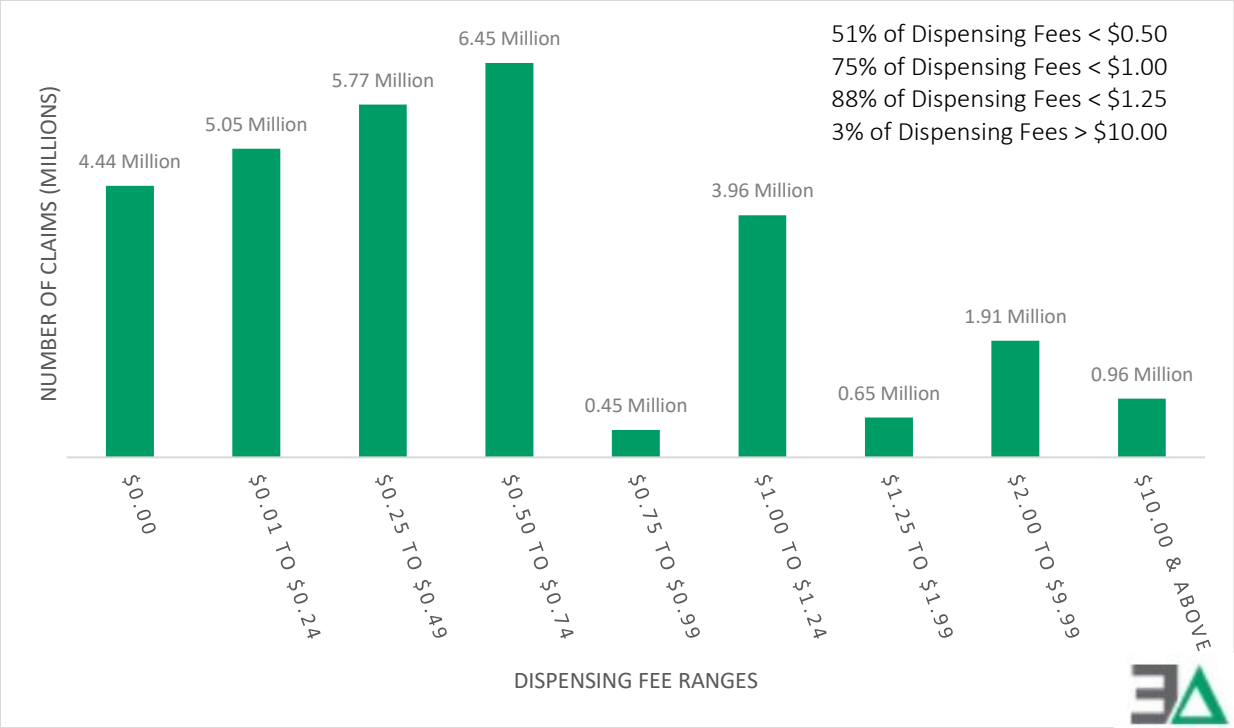
According to the data from retail community pharmacy trade organizations, the total pharmacy overhead costs per claim can be substantive, at over $12 per prescription. (25) As mentioned earlier (**Figure 7**), state Medicaid program cost of dispensing surveys put the mean pharmacy overhead costs at around $10-12 per prescription. However, the dollar amounts that PBMs invest in dispensing fees is far smaller than this amount would suggest. In fact, the average dispensing fee paid to retail pharmacies in our study claims data was $1. This is $11 less (92% lower) than the anticipated need of pharmacies to support their business operations. At the same time, the average drug ingredient cost in our data set was $65.33, which means that approximately 1.5% of total pharmacy reimbursement can be attributed to dispensing fees. In other words, the majority of retail drug costs are explained by the setting of the drug's ingredient cost; not by the dispensing fee.

To explain this dynamic further, we can see in **Figure 12** (on the next page) that over 75% of drug claims in our study had a dispensing fee of a $1.00 or less (so not only was the average $1, but the majority of claims were significantly less). At the same time, less than 3% of claims had a dispensing fee greater than $10.00 (or the amount needed to sustain pharmacy business

[ix] Pharmacies occasionally receive incentive fees on claims as well, but these are generally limited to drugs they administer to patients (such as vaccines).

(if drug ingredient reimbursements set by the PBM were reflective of the actual costs of the medicines).

Figure 12: Analysis of Number of Claims at Various Dispensing Fee Ranges in Studied Pharmacy Claims Data (2020)



All told, we find this analysis compelling that in order to better understand drug prices in the retail pharmacy setting (as represented by our study pharmacy data), we need to focus our analysis on pharmacy claim drug ingredient costs and their basis of reimbursement.

Ingredient Cost Basis of Retail Prescription Drug Costs

NCPDP Field# 522-FM – the field that represents the basis of reimbursement determination – was captured in data for 88% of all claims in the data set from our studied pharmacies. While the defining process is straightforward, the complexity of price is not. Consider that Field# 522-FM has 20 different acceptable values that may be transmitted back to the pharmacy to explain why a given drug was priced by the PBM the way it was (**Table 1** on the next page). (39)

Table 1: NCPDP Basis of Reimbursement Determination Values

Code	Definitions According to NCPDP Standards
0	**Not Specified**
1	**Ingredient Cost Paid as Submitted** - Used to indicate when reimbursement is equal to the amount billed by the provider for the prescription item.
2	**Ingredient Cost Reduced to AWP Pricing** - Used to indicate when reimbursement is based upon the average wholesale price for the prescription item.
3	**Ingredient Cost Reduced to AWP Less X% Pricing** - Used to indicate when reimbursement is based on a discounted average wholesale price for the prescription item.
4	**Usual & Customary Paid as Submitted** - Indicates when the ingredient cost reimbursed to the provider is based upon the submitted Usual and Customary Price.
5	**Paid Lower of Ingredient Cost Plus Fees Versus Usual & Customary** - Used to indicate that the processor has compared submitted U&C to the cost plus the fee (May be either their negotiated value for cost plus fee, or the submitted cost and fee), and is paying the lower of the amounts.
6	**MAC Pricing Ingredient Cost Paid** - Indicates when the ingredient cost reimbursed to the provider is based upon a payer's Maximum Allowable Cost list. (when MAC Basis of Cost was submitted)
7	**MAC Pricing Ingredient Cost Reduced to MAC** - Indicates when the ingredient cost reimbursed to the provider is based upon a payer's Maximum Allowable Cost list. (when other than MAC Basis of Cost was submitted)
8	**Contract Pricing** - Price based upon contractual agreement between trading partners.
9	**Acquisition Pricing** - Used to indicate when reimbursement is based upon the actual cost of the item.
10	**ASP (Average Sales Price)** - The average sales price (ASP) is a cost basis required by and reported to CMS for pricing Medicare Part B drugs.
11	**AMP (Average Manufacturer Price)** - The average price paid to manufacturers by wholesalers for drugs distributed to the retail class of trade; calculated net of charge backs, discounts, rebates, and other benefits tied to the purchase of the drug product, regardless of whether these incentives are paid to the wholesaler or the retailer.
12	**340B/Disproportionate Share Pricing/Public Health Service** - Price available under Section 340B of the Public Health Service Act of 1992 including sub-ceiling purchases authorized by Section 340B (a)(10) and those made through the Prime Vendor Program (Section 340B(a)(8)). Applicable only to submissions for Medicaid and other state or federal programs when required by law or regulation and when the payer and/or processor has communicated a unique RxBIN or unique RxBIN/RxPCN combination to distinguish these from other lines of business that do not meet the requirement.
13	**WAC (Wholesale Acquisition Cost)** - A cost as defined in Title XIX, Section 1927 of the Social Security Act.
14	**Other Payer-Patient Responsibility Amount** - Indicates reimbursement was based on the Other Payer-Patient Responsibility Amount (352-NQ).
15	**Patient Pay Amount** - Indicates reimbursement was based on the Patient Pay Amount (505-F5).
16	**Coupon Payment** - Indicates reimbursement was based on the Coupon Value Amount (487-NE) submitted or coupon amount determined by the processor.
17	**Special Patient Reimbursement** - Indicates the reimbursement was based on the cost calculated by the pharmacy for the drug for this special patient.
18	**Direct Price (DP)** - Represents the manufacturer's published catalog or list price for a drug product to non-wholesalers. Direct Price does not represent actual transaction prices and does not include prompt pay or other discounts, rebates or reductions.
19	**State Fee Schedule (SFS) Reimbursement** - State mandated level of reimbursement for Workers' Compensation or Property and Casualty prescription services.
20	**National Average Drug Acquisition Cost (NADAC)** - The estimated average drug acquisition cost as defined by CMS.

Reviewing **Table 1** is important, as it can help us appreciate why context is so important in analyzing drug prices. Several manufacturer price points can mix with pricing information from other sources (more on that later) to generate 20 different known reasons why one drug price may look different from another. Because this is an area of drug pricing not routinely discussed, we will proceed with an evaluation of the prevailing basis of reimbursement determinations –

or more simply, the methods PBMs use to set the prices of medicines – made within the data set we are relying upon for this analysis.

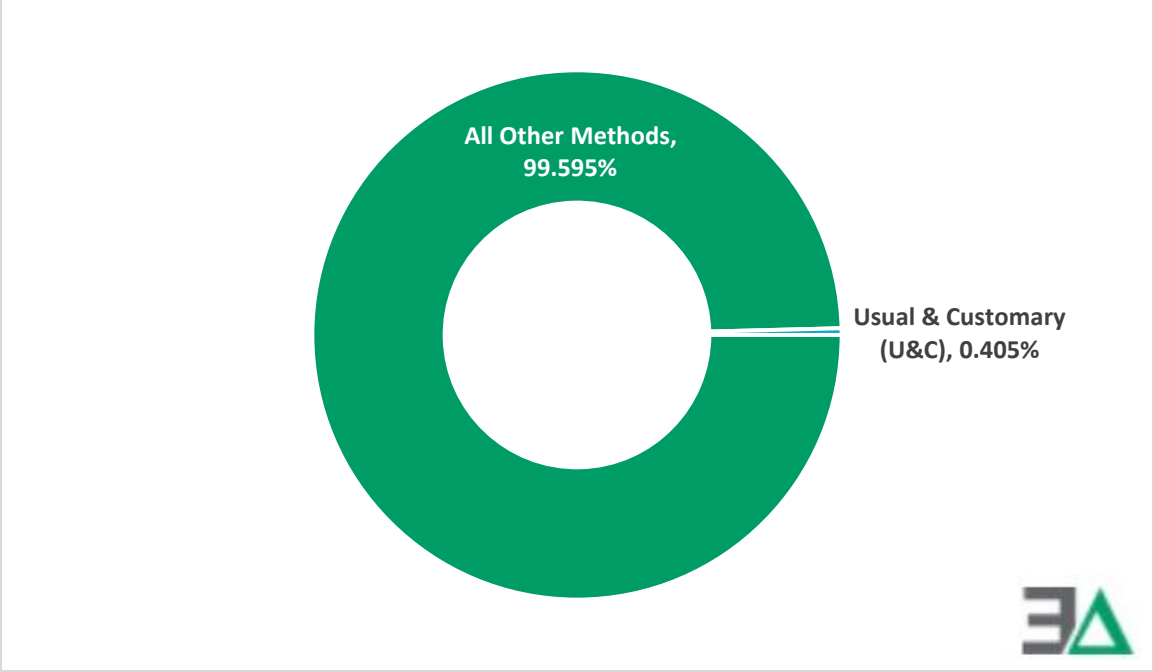
Basis of Retail Prescription Drug Costs Attributable to Pharmacy-Set Prices

We began this section by stating our goal was to remove potential supplier-side variability in order to enable a study of price changes attributable to drug manufacturer prices. If the commonly held belief of U.S. drug price dynamics – that manufacturers alone set the prices of medicines – was true, we anticipated that we would see no difference in price if we held equal all other pricing dynamics but the manufacturer (and therefore, their price point). However, we were unable to generate a database that aligned to the idea that manufacturer-set list prices were the primary determinant of the prices of medicines at the pharmacy counter. The basis of reimbursement determination can help us further appreciate why this may be.

In reviewing **Table 1** (on the previous page), you will note that one supported rationale for why drug prices are the way they are is that payment (i.e., the price utilized by the PBM to determine the point-of-sale price) was at the pharmacy provider's submitted **usual and customary (U&C)** amount. This price point represents the amount of money the pharmacy would charge a customer to buy the medication if they did not have insurance (i.e., a price that reflects the drug's acquisition cost, associated overhead costs, and desired profit).[x] As a result, contracts for reimbursement between pharmacies and PBMs/insurers are predicated off the concept of "lower of" reimbursement. This means that the payment rate to a pharmacy will be either the amount determined through the PBM-to-pharmacy contract (based on one of the other codes in **Table 1**) or the amount the pharmacy requested to be paid (its U&C) – whichever is the lowest amount. Therefore, the basis of reimbursement determination provides us with the opportunity to re-assess our earlier attempts to hold supply-side variability unchanged by specifically looking at claims where the drug price was determined based upon the pharmacy's submitted price point (i.e., their U&C). As can be seen in **Figure 13** (on the next page), the pharmacy-set price point was used as the basis of determining a drug's cost in less than 1% of all cases.

[x] Note that a U&C price is submitted as a single value by pharmacies (it is not broken out into an ingredient cost and dispensing fee request).

Figure 13: Percent of Claims Paid at Usual & Customary (U&C) Price within Studied Pharmacy Data (2020)



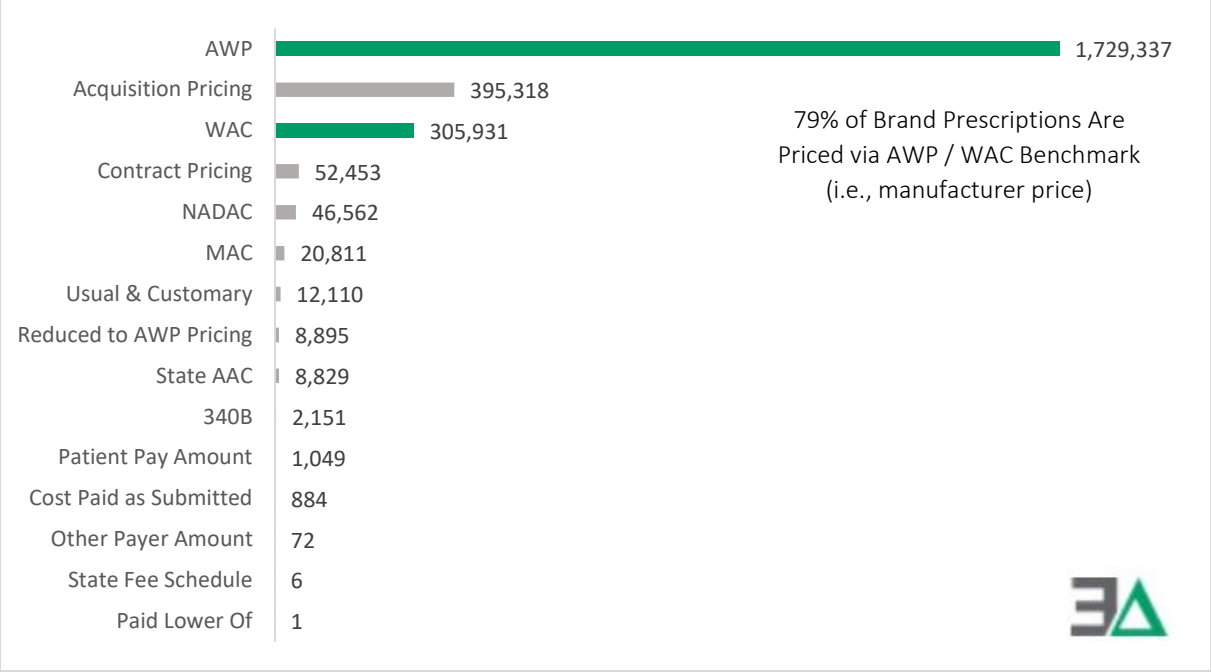
In essence, we can interpret **Figure 13** to signify that the prices set by pharmacies had a very small role in establishing actual drug prices yielded at the pharmacy counter (given that effectively 1 in 200 prescriptions were determined based on the prices charged by pharmacies in our study). However, that interpretation would overlook the role of pharmacy contracting. As we just mentioned on the previous page, contracts between pharmacies and PBMs are predicated off of "lower of" language. This means that **if** pharmacies were to set lower U&C price points, then the drug prices established at the pharmacy counter would likely get cheaper (if they were set below whatever the current basis of reimbursement was). We will explore this concept later (as pharmacies appear to lack the incentive to set lower prices); however, before we do, we first need to unpack what the actual basis of reimbursements were in the studied retail pharmacy data set.

Basis for Setting Brand Drug Prices

What is well understood by industry, but poorly defined in research, is that health insurance intermediaries (i.e., PBMs) often use different methodologies or benchmarks to price brand and generic drugs. This is true both at the pharmacy level, but also at the plan sponsor level as well (see our earlier sections on **Prescription Drug Contracting**).

For brand drugs in our data set, PBMs overwhelmingly informed pharmacies, via their basis of reimbursement determination codes, that payment was predicated on AWP (67% of the time). All told, the manufacturer-set prices of WAC, and by extension AWP, were relied upon 79% of the time when determining brand drug costs (see **Figure 14** on the next page). (40)

Figure 14: Basis of Reimbursement Determination Given by PBMs on Brand Claims, Studied Pharmacy Data (2020)



On its surface, **Figure 14** would seem to support the prevailing understanding of the nature of drug prices in the U.S. If manufacturer list prices are relied upon approximately 80% of the time to set brand drug prices, then if brand manufacturers set lower prices, everyone taking those brand drugs would enjoy savings. However, our review of brand drug pricing within this data set does not support that conclusion.

Brand Contracting and Drug Wholesaling

Recall from our introduction that prescription drug contracting is reliant upon drug pricing benchmarks. PBMs that base brand drug pricing guarantees with providers on manufacturer list prices (i.e., AWP/WAC) are paying for drugs in relation to a drug pricing benchmark. In general, the contract between a PBM and a pharmacy will establish a price for a brand drug based on a fixed percentage discount to these benchmark prices per pharmacy network. Unsurprisingly, based on the reviewed payment mechanism for brands by PBMs, surveys of pharmacy acquisition costs (i.e., NADAC) demonstrate that providers purchase brand drugs at a median WAC invoice discount of 4.0% (AWP – 20.0%) and a mean discount of 4.7% (AWP – 20.7%). (41) Indeed, our own experience with retail pharmacy wholesaler agreements align with NADAC estimates; that is that most independent and small chain pharmacies enter into wholesaling agreements to purchase brand drugs at WAC discounts ranging between 3% and 5%.

All else being equal, we can use this understanding of pharmacy acquisition costs for brand drugs to better analyze the role of PBMs on brand drug pricing dynamics at the retail pharmacy level. First, there appears to be little variability in the discounts pharmacies secure in purchasing brand drugs. NADAC informs us that the variability in brand drug prices appears to be relatively minor, as the difference between the median and mean is less than 1%. Our own experience suggests that the prevailing discount for brand purchases produces a similar

narrow band in high to low (i.e., 2% difference between WAC – 3% to WAC – 5%). PBMs attempting to secure brand prices at or near the provider's acquisition cost could reasonably do so by setting the reimbursed price in such ranges (for the sake of completeness, a conversion of WAC minus 3% to 5% – the estimated provider cost to acquire a brand drug – would result in AWP discounts ranging between AWP – 19% to AWP – 21%). However, the claim experience of the retail pharmacies in our study demonstrated far greater disparities in brand prices than these ranges would suggest.

To quantify the financial impact of brand drug purchasing, the average brand drug prescription in this analysis had a WAC price of $526 (which is an AWP equivalency of $631), suggesting the average provider cost to acquire ranged between $499.70 (i.e., WAC – 5%) to $510.22 (i.e., WAC – 3%). Said differently, there was an estimated $10 difference between the best- and worst-case experience for the average brand prescription. The low variability in provider brand drug procurement cost and the existence of only one list price for any brand drug should result in low retail price volatility; particularly if only the manufacturer price dynamic is responsible for pricing variability.

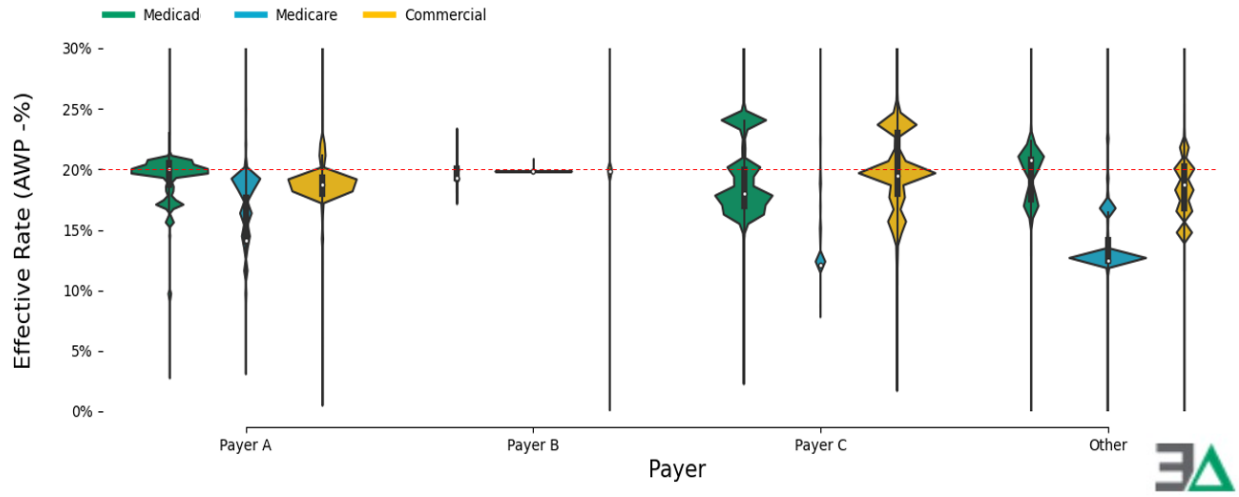
To evaluate brand reimbursement in our studied pharmacy data, we determined the AWP discount for all brand drug transactions among PBMs and lines of business (see earlier section on **The Makeup of the U.S. Drug Insurance Marketplace**) in which AWP or WAC was indicated as the basis for PBM's determination of the drug's price. We are displaying the results based on AWP, because AWP is the predominant benchmark used in PBM contracting and per our review of claims data in this analysis (see **Figure 14**). Furthermore, as a result of lawsuits in the early 2000s, there is a linear relationship between AWP and WAC for brand products (therefore any analysis of brand AWPs can be easily translated into brand WACs, and vice versa). We then plotted the findings on a violin chart in **Figure 15** (on the next page).

Which price is **the** manufacturer's price?

Drug manufacturers generally discuss their drug pricing in the context of WAC, but plan sponsors, PBMs and pharmacies generally discuss brand prices in terms of AWP. As a result, some may question which price point is actually **the** manufacturer price point. The reality is that both WAC and AWP are effectively the same price point for brands, just on a slightly different scale.

Before the mid-2000s, brand manufacturers generally reported both an AWP and WAC to drug pricing compendia files. However, following lawsuits that resolved in the mid-2000s, brand manufacturers generally only report WAC. (87) However, the rest of the supply chain is reliant upon AWP (see Prescription Drug Contracting earlier in this report) and so the supply chain has adopted policies which will report an AWP regardless of whether or not the manufacturer supplies the price point. The relationship between AWP and WAC for brand products is fixed. AWP is a 1.2-multiple of the WAC, therefore, a brand's AWP and WAC are effectively the same price (just at different scales).

Figure 15: Distribution of Brand AWP Discounts by Payer and Line of Business for Claims where the Drug Manufacturer's List Price was Used by the PBM as the Basis of Payment, Studied Pharmacy Claims (2020)



The violin chart provides a visual of AWP discount rates and distribution of those rates across PBM payers and their different lines of business. Distribution is reflected by the size of the "blob" in each distinct PBM and line of business observation. A wider blob represents more transactions at that particular point. A red line was placed at AWP – 20% to represent the estimated median provider cost to acquire brand drugs (i.e., WAC – 4%). Blobs below the red line represent a PBM's prescription payment ***above*** the estimated provider's cost to acquire the drug (i.e., a lower discount is a higher price), while blobs above the red line represent a PBM's prescription payment below the provider's estimated cost to acquire the drug. In this way, the line provides a visual approximation for claims the provider is making a profit at (i.e., below the red line) in comparison to claims the pharmacy providers are losing money on (i.e., above the red line).

Figure 15 (above) illustrates that each PBM established many different prices for brand drugs despite the narrow window providers pay to acquire these drugs. Said differently, we know that the variability in what providers actually acquire drugs for is a smaller band of price points than the variety of prices we see in **Figure 15**. If claims were being paid in relation to acquisition costs we would expect to see no claims lower than AWP – 19% and none higher than AWP – 21%. However, the range of payments in **Figure 15** are far greater than these ranges. For example, the PBM represented as Payer A demonstrated that within its Medicare line of business (blue), there were many distinct brand pricing bands. Specifically, we can see the blobs or claim utilization concentration around 12%, 14%, 16%, and the 18% to 20% range. The data suggests that the average brand claim in our data set (i.e., aforementioned WAC $526; AWP $631) may range in retail price between $505 to $556 per prescription – a 10% price difference. The $51 gross price differential in payment is much greater than the $10 estimated provider cost to acquire range we arrived at earlier ($499.70 to $510.22).

A comparison between all PBMs suggests even greater gross price ranges exist. The lowest price among the group of PBMs appears at AWP – 25% (Payer C's Commercial line of business) and the highest at AWP – 8% (Payer A's Medicare line of business). Taken together, the estimated brand price range on a drug with an average brand AWP of $632 is between $474

to $581 (a $107 difference) or a 23% range. The impact of these variable payments can have significant downstream effects. If you are a patient whose cost sharing is determined as a portion of a drug's costs, paying 25% of $474 dollars is a lower amount than the same 25% of the $581.

It should be noted that not all PBMs appear equal in the variance of brand price experience. As observed in **Figure 15**, Payer B had very few claims that fell outside of their brand AWP bands for Medicare and Medicaid claims. While we believe the above provides a reasonable understanding of the role PBMs play in determining a drug's price at the pharmacy counter beyond what the drug manufacturer is setting, we feel that an individual drug can enhance understanding of the variance in pricing with brand drugs – and its impact on providers and patients. This is because a singular drug will have only one set of manufacturer set prices at any given time (as we saw with our earlier duloxetine example), and therefore limit any confounding variables to price from our analysis above.

Brand Drug Pricing Case Study: Eliquis

In 2020, Eliquis®, a popular medication used to treat and prevent blood clots, was responsible for $9.9 billion in gross Medicare drug expenditures (the singular highest gross spending medication in Medicare that year). (42) This was nearly double the amount of the next closest drug, Revlimid, at $5.4 billion in gross Medicare expenditures during that same year. Eliquis®, therefore, could be argued was the most financially important drug during that year (if value is contextualized to gross expenditures alone).

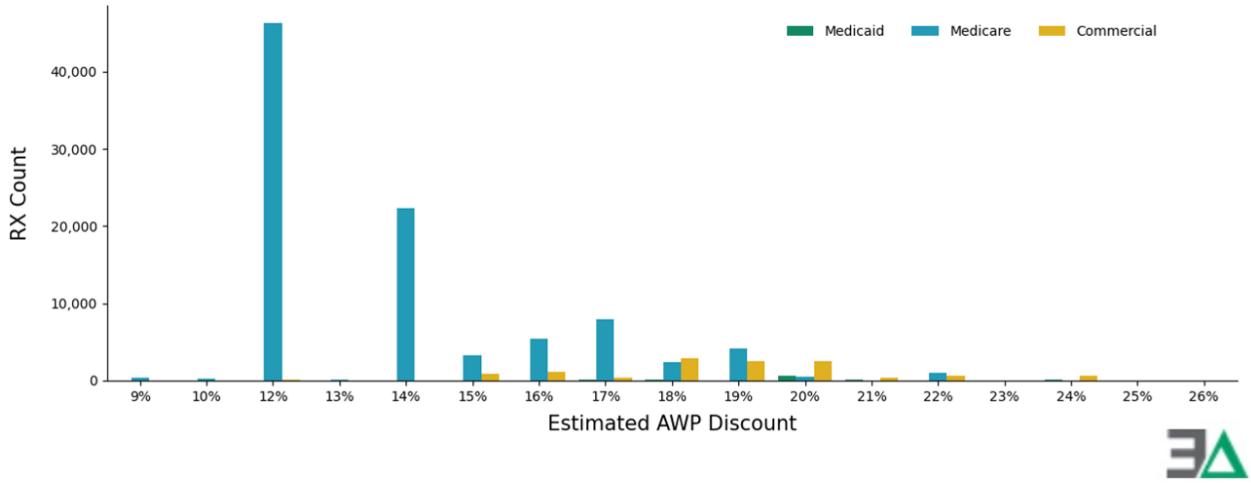
The WAC price for a typical 30-day supply of Eliquis® 5 mg in 2020 was $471. This is because there was only one established WAC price by the drug manufacturer for the entirety of 2020, which means we needed not concern ourselves with weighting the price across the various days of 2020 (the price was established on 1/1/2020 and was not changed by the manufacturer until 1/1/2021). The listed WAC price of $471 is based on the typical dosed quantity according to labeling, but also based on the average quantity dispensed in our studied retail pharmacy claims data set (a nice coincidence that those numbers align).

The pharmacy data we are studying from 2020 yielded just over 107,000 claims for Eliquis across all lines of business in which a basis of PBM price determination was either WAC or AWP. Recall, that based upon the drug's list price and the understanding of pharmacy acquisition price, we would estimate that the typical pharmacy would be able to acquire Eliquis® 5 mg between $447 to $457 per 30-day supply. As way of supporting our estimate, the NADAC price for the same quantity of pills ranged between $451.94 and $452.13 in all of 2020. Whether based on our own industry experience, or the NADAC survey, or the publication of a list price by the manufacturer, the established cost to acquire an Eliquis® script does not appear at all variable in 2020.

Despite the little pricing variance that exists in acquiring Eliquis®, the claims data for our study pharmacies tells a very different story about reimbursement for this drug (i.e. the prices the PBM set at the point-of-sale). As displayed in **Figure 16** (on the next page), the number of claims (Rx count) at each PBM reimbursement level (displayed as an AWP discount) varied significantly, regardless of which line of business we focus in on. The estimated AWP discount ranged between AWP – 9% (i.e., $514 in reimbursement) to AWP – 26% (i.e., $418 in

reimbursement). There is nearly a $100 difference between the "worst" and "best" PBM price of Eliquis®. While the largest purchaser of Eliquis® at our study retail pharmacies was Medicare, PBMs often saddled seniors with the worst price relative to the prices that the same PBMs set in other lines of business (as demonstrated by a lower, on average, AWP discount [blue bars]).[xi]

Figure 16: Eliquis Reimbursement Distribution by Line of Business for Largest PBM in Data, Studied Pharmacy Data (2020)

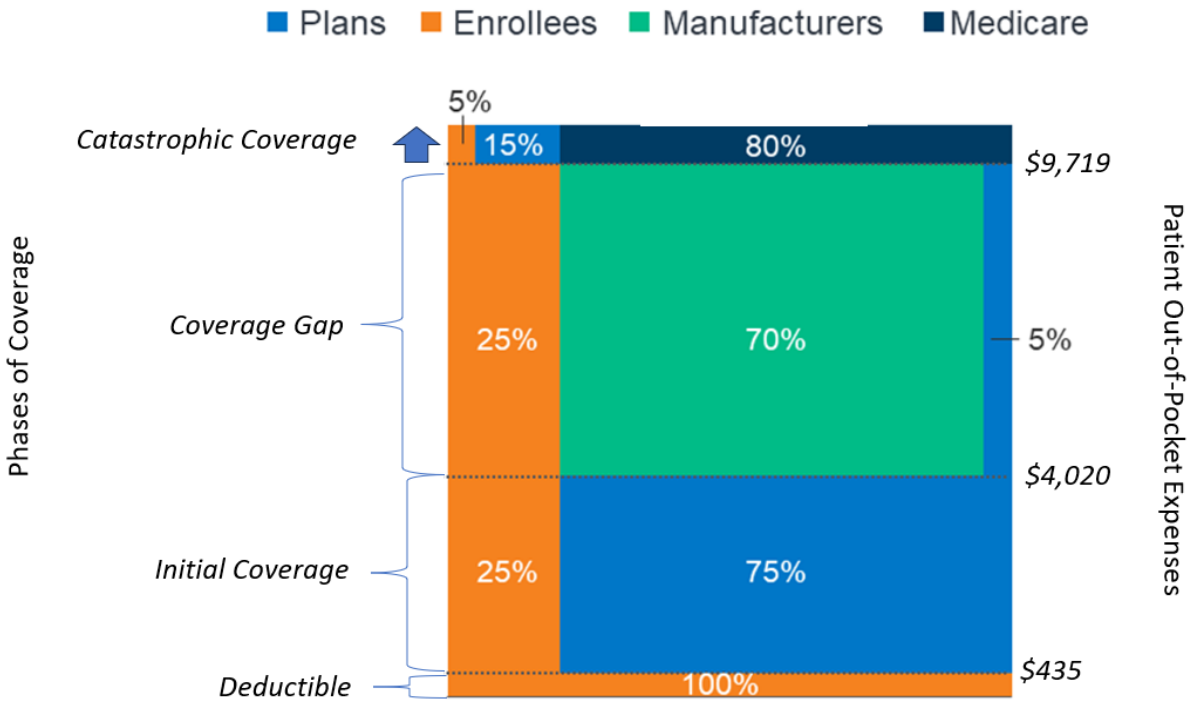


The variability in the PBM-set Eliquis® price presents us with a unique opportunity to attempt to contextualize the net impact on a typical consumer's price (for Eliquis®, this would be a person in Medicare).

Consider that in 2020, the $100/month ($1,200/year) differential created based on PBM price-setting variability ranging from a high of AWP – 9% to a low of AWP – 26%. For the unfamiliar, drug coverage in Medicare is broken down into phases, with beneficiaries receiving the most financial support from their health plan in the initial phase of coverage (see **Figure 17** on the next page).

[xi] It is worth noting that retail pharmacy claims will not reflect any retrospective price concessions, including the impact of Medicare Direct and Indirect Remuneration (DIR). However, Medicare's definition states that the retail price at the pharmacy counter, known as the negotiated price in statute, is required to be "the costs for prescription drugs agreed upon through direct negotiation between the Part D sponsor or an intermediary contracting organization, such as a pharmacy benefit manager (PBM), and the pharmaceutical manufacturer." (CMS Press Release, Jan 2009). Given the low variability in the acquisition price of Eliquis (as represented by its singular manufacturer price point), it seems unlikely that a failure to reasonably negotiate the acquisition cost of Eliquis® would explain its pricing variability In **Figure 16**. Said differently, the blue bars being more variable than the other colored bars suggest it was more difficult to reasonably estimate the Medicare price than other payer types without a clear rationale for why that would be the case.

Figure 17: Medicare Part D Cost Share Percentages, Standard Benefit (2020)[xii]



In 2020, Medicare enrollees were in their initial coverage phase after they had spent $435, but before their total spending reaches $4,020 in out-of-pocket costs by the member. Effectively, this means that after the Medicare enrollee pays the first $435 of drug costs out of their own pocket (with no support from their health plan), their next expenditures are covered on a 75/25 split (health plan and the patient's cost respectively) until the member's out-of-pocket costs reach $4,020. If this seems complicated, it is, but that was the system design at the time (and the only difference to today is largely the dollar thresholds). Regardless, because Medicare members receive different financial support depending on which phase of coverage they are in, and because phases are determined based upon the patient's out-of-pocket spending, the real impact of Eliquis® brand pricing disparities can better come into focus.

A Medicare plan in which a PBM set the price of Eliquis® at AWP – 26% (i.e. $418 per prescription) would offer 8.5 prescription fills to their members during the initial coverage phase (i.e., $4,020 coverage limit – $435 patient deductible = $3,585; $3,585 out-of-pocket costs ÷ $418 price per script = 8.5 prescription fills). In comparison, a plan with a set price of AWP – 9% only offers 7 prescription fills worth of Eliquis® during the initial coverage phase. **The plan with the more aggressive discounted AWP price point is offering more than 20% in added value** (1.5 more prescription fills of their medication) for their members based simply on differentials in PBM brand pricing experiences.

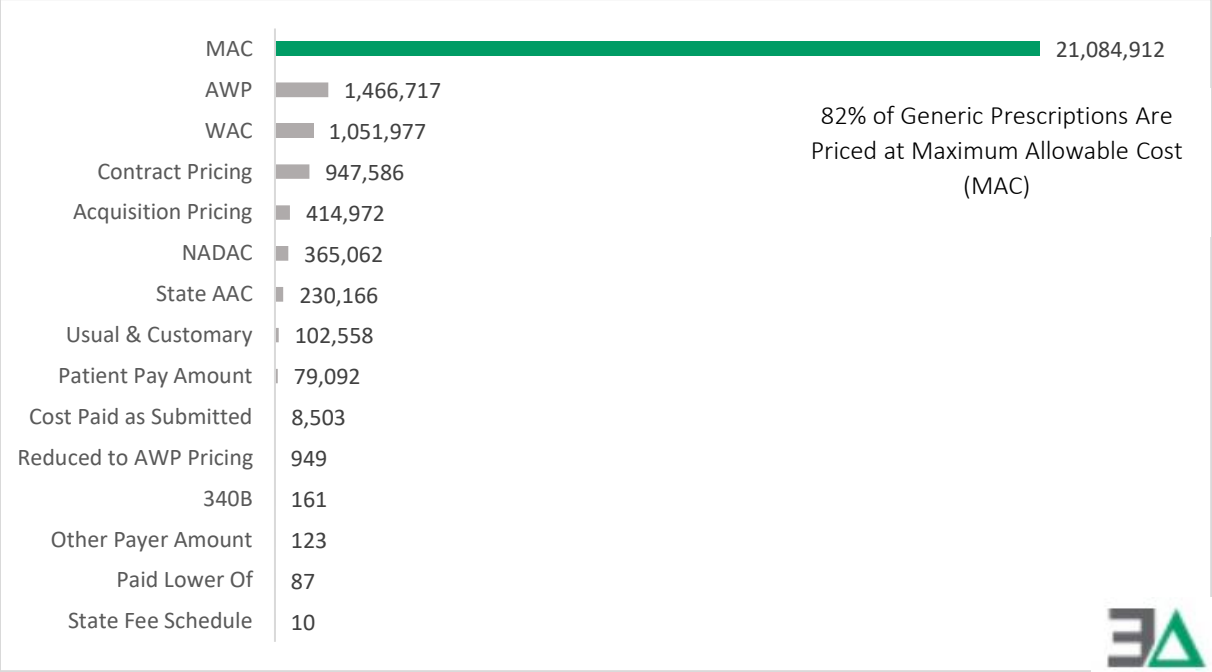
[xii] Modified from KFF: *How Will The Medicare Part D Benefit Change Under Current Law and Leading Proposals?* Available here: https://www.kff.org/medicare/issue-brief/how-will-the-medicare-part-d-benefit-change-under-current-law-and-leading-proposals/

Regardless of whether we analyzed the aggregate brand drug experience or individual brand drugs in our studied retail pharmacy claims data, there appears to be more context needed to understand brand prices than simply the manufacturer-set prices. Said differently, brand manufacturers alone are not responsible for drug prices experienced by health plans and patients. That said, because prices are set in relation to the drug manufacturer's pricing benchmarks (discounts to AWP/WAC), there would likely be savings on medicines if manufacturers were to lower their price points. The issue we are observing and highlighting is primarily that it is clear that any sort of discounting by manufacturers would not have a universal or guaranteed lowering of plan or patient costs. This is because we observe that the relationship between a manufacturer's price and the discount given is variable. Any changes in manufacturer price can be reasonably assumed to result in varied plans and patient financial outcomes as a result (as this is the current status of discounts).

Basis for Setting Generic Drug Prices

Having explored the basis of PBM reimbursement for brand drugs, we now transition to explore the rationale given for the reimbursement pharmacies receive from PBMs for generic drugs (**Figure 18**). As before, one basis of reimbursement dominates the rest in determining how generic drug costs are recognized by retail community pharmacies, and thus, by extension, how the yielded prices impact patient cost-sharing. However, unlike with brands – where manufacturer list prices of AWP and WAC dominated basis of price determinations (though PBM-set discounts were disparate) – PBMs overwhelmingly (i.e., 82%) use maximum allowable cost (MAC) methodology to set the retail price for generic claims.

Figure 18: Basis of Reimbursement Determination Given by PBMs on Generic Claims to Studied Pharmacy Data (2020)



Because generic drug claims represent approximately 9 out of every 10 claims filled (see **The Makeup of the U.S. Drug Insurance Marketplace** section earlier), this means that 64% of all

retail community pharmacy claims in our database (i.e., both brand and generic), were determined by PBM-established MAC rates.

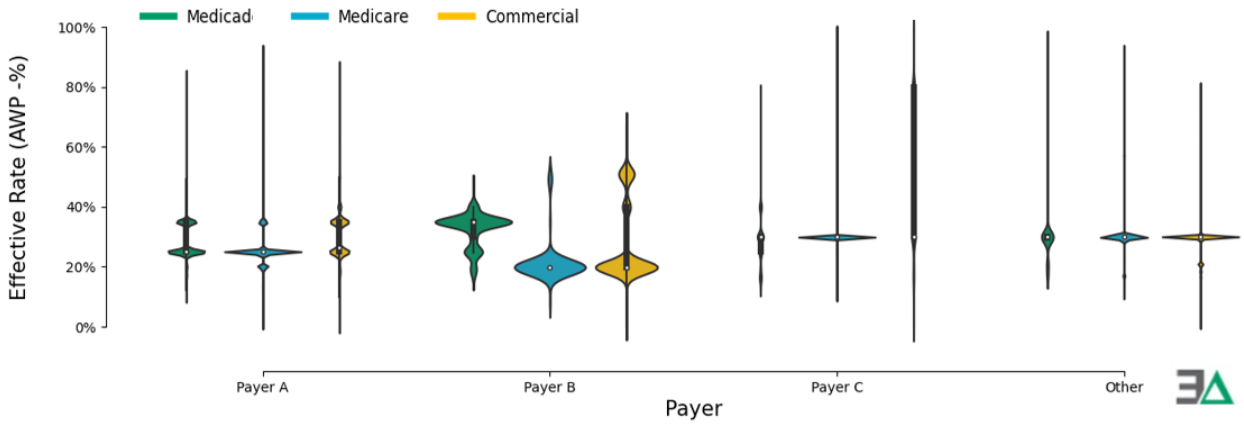
As a reminder, MAC (see earlier **Maximum Allowable Cost (MAC)** section) is a price that represents the upper payment limit that PBMs assign to a multi-source generic drug. The value of MAC, according to PBM advocacy organizations, is that "MAC pricing is designed to promote competitive pricing for pharmacies as an incentive for them to purchase less costly generic drugs available in the market, regardless of the manufacturer's list price, since manufacturers will charge different amounts for equally interchangeable generic drugs." (19) The methodology which PBMs employ to set MAC prices is generally considered proprietary, undisclosed, and therefore lacking transparency and accountability in regard to how they are set. Despite the commonly held belief that drug prices are determined solely by the drug manufacturer, the definition of MAC by PBM advocacy groups demonstrates that parties beyond the manufacturer can play a significant role in determining a drug's price – especially when considering that the price the PBM sets at the pharmacy point-of-sale can have a direct impact on the finances of the pharmacy, the plan sponsor, and the patient. As we will see, MAC pricing can enable PBMs to set many different prices for the same drug. The overwhelming use of MAC methodology for the purposes of determining pharmacy payment rates demonstrates that PBMs are independently responsible for setting retail prices for most prescriptions in the U.S. (again, outside of the commonly held belief that manufacturers alone set drug prices).

Generic Drug Pricing and Discounts Based on List Prices

While a majority of generic drug claims have prices that are based on PBM-assigned MAC prices, list price discounting was the basis of reimbursement determination given for 8% of all covered generic drug claims (1.4 million claims with prices based off AWP and 1 million claims based off WAC). As a result, we can begin our study of generic drug prices realized at the pharmacy counter in much the same way we did with brands, by attempting to contextualize those point-of-sale rates in relation to the list prices set by the drug manufacturer; specifically for those claims where the PBM directly attributed the basis of reimbursement to the manufacturer list price.

To perform this analysis, we created the same violin chart as we outlined in the earlier brand section with the only difference being that we're now using generic drug claims whose foundational source of price basis was AWP or WAC. As before, we're displaying the results in relation to the AWP discount (even though WAC was used to a degree) because it reflects the manner of most pharmacy contracting. As can be seen in **Figure 19** (on the next page), there is significantly greater variability in generic pricing relative to brand prices when manufacturer-set prices are relied upon as the PBM basis to adjudicate retail pharmacy claims.

Figure 19: Distribution of Generic AWP Discounts by Payer and Line of Business for Claims with Manufacturer List Price Used by PBM as Basis of Reimbursement within Studied Pharmacy Data (2020)



As before, there is meaningful variability of drug price points amongst PBMs across lines of business. The greater variability in generic prices at the upper and lower end of AWP discounts compared to brands means that the net impact to drug spending is greater and more variable for generics than previously shown with brands. For example, consider a hypothetical generic drug with a $150 AWP value per claim. The drug's retail price may be discounted by PBMs to as low as $75 (AWP – 50%) or as high as $120 (AWP – 20%) based on the observations in **Figure 19**. Overall, the two different contracted rates represent significantly different values despite basing their negotiated price off the same benchmark (i.e., AWP).

Misaligned Incentives with Generic Drug List Prices

Unlike brands, there is no fixed relationship between a generic drug's WAC price and its AWP. As a result, reimbursement conducted through discounting a generic drug's list price may result in misaligned provider incentives. Consider the previous example using AWP – 50% as the PBM's contracted generic effective rate with pharmacies. Manufacturer A offers a version of the drug that has an AWP of $150 with a provider's actual cost to acquire of $75, while manufacturer B's version has an AWP of $200 and provider actual cost to acquire of $85. Manufacturer A's version of the generic has a 13% lower pharmacy procurement cost ($75 vs $85) but a 25% lower list price ($150 vs $200). The result of a reimbursement methodology based on a discount of the drug's list price for this set of generic drugs is that the pharmacy provider is incentivized to select the higher priced product in order to generate more revenue (and ultimately profit) (**Table 2** on the next page).

Table 2: Example of Misaligned Provider Generic Drug Dispensing Incentives Relative to a Drug's List Price

Drug Product	Pharmacy Acquisition Cost	Manufacturer's AWP	PBM List Price Discount (Effective Rate)	Total PBM Reimbursement to Pharmacy	Pharmacy Profit	Pharmacy Gross Margin
A	$75	$150	AWP – 50%	$75	$0	0%
B	$85	$200	AWP – 50%	$100	$15	15%

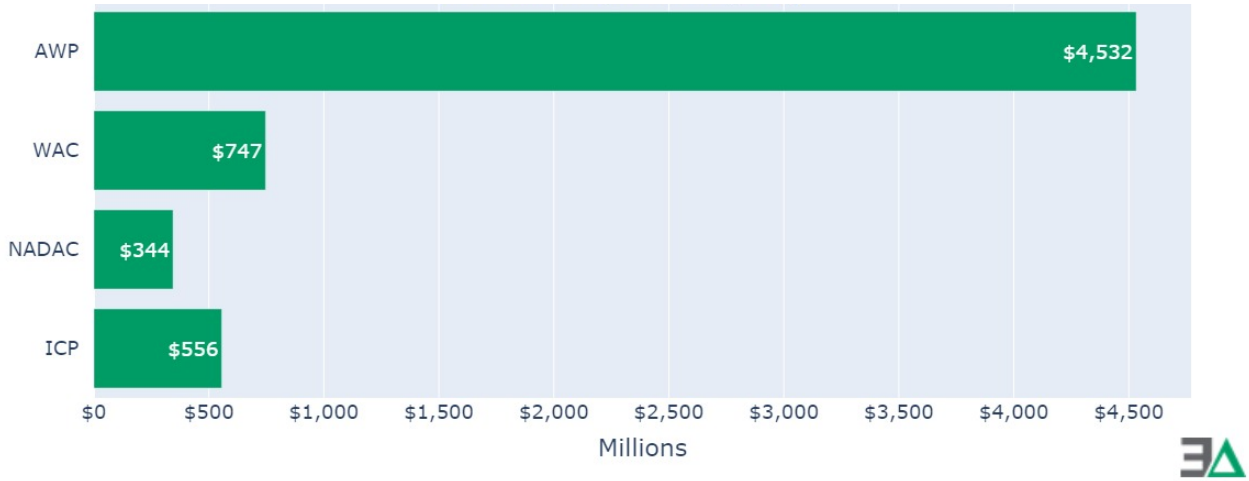
An understanding of **Table 2** is helpful when we consider the knock-on effects to plan sponsors. If you're a plan sponsor whose contract for generic drugs is a fixed discount to AWP, then the provider's incentive to select the higher AWP adds costs to your drug expenditures. If the plan sponsor had secured a generic discount of AWP – 85% for these drugs, then Drug B is $7.50 (33.3%) more expensive per script.

This example is demonstrative of the challenges with drug pricing (and reimbursement) at retail community pharmacies. When the majority of claims are paid at a proprietary PBM benchmark which lacks transparency and objective standards (i.e., MAC), providers will look for some benchmark to hold pricing reasonable and accountable (see **Effective Rate Guarantees** section below). However, while drug manufacturer list prices dominate the contracts used in retail pharmacy contracts, they may not be representative of the actual cost to acquire, creating opportunities for both pharmacies and PBMs to arbitrage drug prices.

Effective Rate Guarantees

As discussed, AWP is by far the most utilized benchmark PBMs used to guarantee generic payment arrangements with health plans. As we have seen, MAC payments are the most common benchmark used at the point-of-sale (but they may be reconciled to an effective AWP discount as well [depending upon the contract]). However, it is also well documented that AWP is a poor predictor of actual generic drug costs. (43) Following the many AWP lawsuits from the mid-2000s, many industry observers were asking what benchmark would replace AWP. (44) However, nearly 15 years later, we know that no benchmark has effectively replaced AWP. Let us consider why this might be by comparing how AWP estimates of drug costs compare to WAC, NADAC, and the ingredient cost paid within our studied pharmacy data. **Figure 20** (on the next page) identifies the value of generic dispensing based on their AWP, WAC, and NADAC pricing benchmark values (calculated as each benchmark's unit cost multiplied by the number of units dispensed by our study's community pharmacies throughout 2020), as well as the actual point-of-sale ingredient cost payment (ICP) from PBMs for those transactions (note **Figure 20** only displays results if the claim had all three benchmark prices available).

Figure 20: Total Generic Drug Claims at Various Pricing Benchmarks within Studied Pharmacy Data (2020)



As can be seen in **Figure 20**, AWP valued the group of drugs at $4.5 **b**illion, while WAC valued the drugs at $747 **m**illion, and NADAC valued the drugs at $344 **m**illion. The PBMs' actual ingredient cost payment (ICP) to the pharmacies for these same generic drug claims was $556 **m**illion. The data tells us that on average, PBMs discounted AWP at an average rate of 87.9%, WAC at 25.6%, and paid NADAC at NADAC plus 61%. All three formulas produce the exact same drug ingredient cost calculation. However, we can see drastic differences in how we arrive at the prices actually set and paid to the pharmacies.

A common question may be why not use a pricing benchmark such as WAC or NADAC that more accurately represents true generic drug procurement costs? We struggle to think what other transactions we routinely buy at an 85%+ discount to the list price. For example, consider what would happen if we applied generic drug prices to say purchasing a car. Kelley Blue Book informs us that a 2023 Ford F150 Super Cab XL V8 would have a MSRP of $47,705, an invoice price of $45,643, and a fair purchase price of $45,205 (an approximate 6% discount off the manufacturer suggested retail price). However, if we applied our generic learnings to our hypothetical car purchase, we're now anticipating a MSRP of $373,595 (**Figure 21** on the next page).[xiii]

[xiii] To arrive at this figure, we're inflating the fair purchase price by the ratio observed with the AWP average for generic drugs to arrive at the new MSRP.

Figure 21: If Trucks were Priced Like Generic Drugs

If we change the paradigm of car purchases to mirror that of generic drug purchases, we can negotiate an 87.9% discount under the $373K MRSP truck scenario and arrive at the same price we paid historically (fair price of $45,205). However, we should appreciate what happens if we fail to secure the best discount. A 1% delta in MSRP-to-purchase-price today is worth just under $500; however, under our drug price scenario for trucks, a 1% delta balloons to a $3,736 delta (a 7.5-fold difference). The knock-on effects of such pricing are hard to fully appreciate. How much more expensive are car insurance premiums if the underlying value of what we're insuring is 1) so much more expensive; and 2) subject to such significant differences in price based on discounts purchasers are able to secure. In addition, we should consider what would happen to broader consumer confidence if our everyday purchases functioned more like drug prices, where volatility in price was potentially 8-fold what they are today.

Putting these hypotheticals aside, let's consider the value associated with each pricing benchmark to the potential contract which may govern drug prices. It is well documented that many PBM models operate off of pricing differentials, with the traditional PBM model being financed based on differences between what PBMs charge their plan sponsor clients in comparison to what they pay pharmacy providers. The value of 1% of the total reference price for our retail generic claims in 2020 was $3.4 million for NADAC, $7.4 million for WAC, and $45.3 million for AWP. As such, minimal differentials between provider and plan sponsor client contracts based on AWP logic creates the largest opportunity for PBMs to capitalize on pricing

arbitrage, or what is commonly referred to as spread pricing. We postulate that this helps explain why, 15 years later, AWP continues to dominate contractual arrangements in the pharmacy benefits industry.

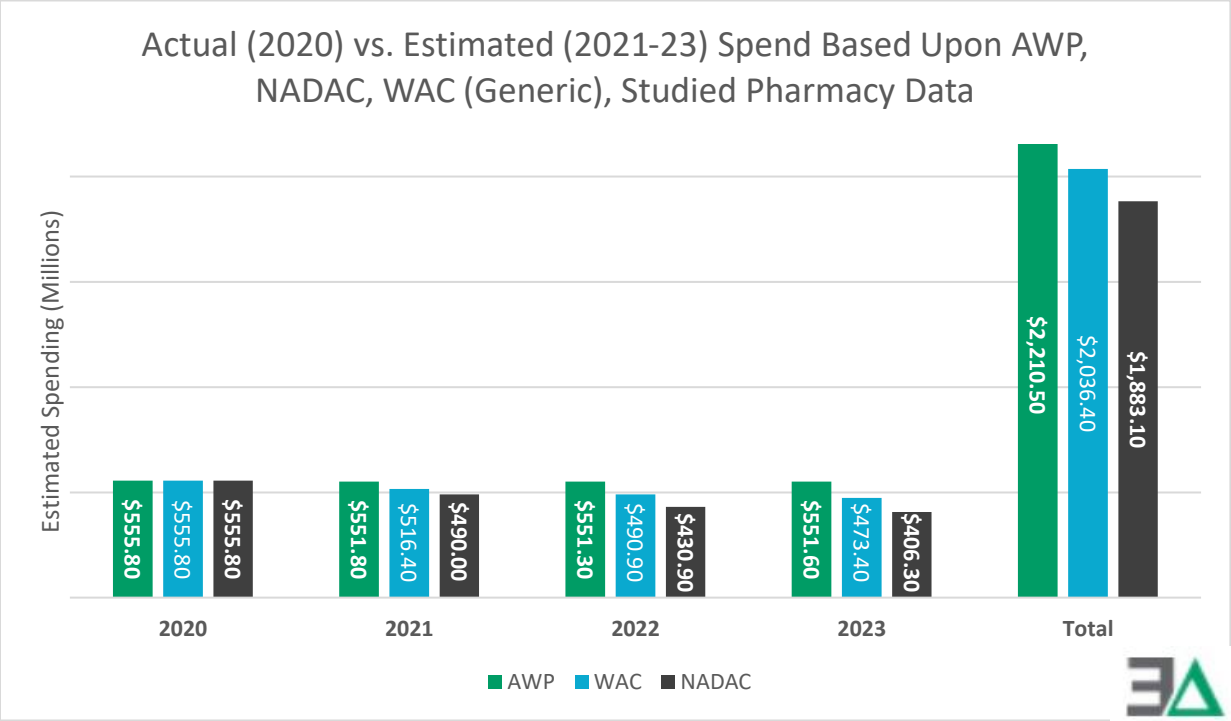
We can reinforce our understanding of why AWP continues to dominate PBM contracts if we evaluate how each benchmark reacted to changes to generic costs since 2020. To perform this analysis, we took each NDC and the total units dispensed from our study pharmacies in 2020 and recalculated the value of each benchmark using yearly weighted values for each year to present. For 2023, we used the first two quarters' weighted benchmark values, as that is the most recent pricing data available at the time of composing this report [see **Methodology** for details]. **Figure 22** (below) shows that each of the three benchmarks experienced deflation, but to varying degrees. The largest decrease in price, on a benchmark basis, was NADAC, which deflated 26.9% (equivalent to $92.8 million dollars in value). Recall that NADAC is a survey of actual acquisition costs by retail community pharmacies, so in effect, this demonstrates that the competitive market forces of generic drug purchasing effectively worked to reduce the prices pharmacies had to pay to buy their drugs. However, the manufacturer list price of WAC decreased by 14.7% (a $110.88 million value), whereas AWP decreased just 0.8% (or $36 million).

Figure 22: Yearly Changes in Benchmark Prices for Retail Generic Drugs Based on 2020 Studied Retail Pharmacy Utilization (2020 to 2023)

If we assume PBM payment arrangements did not adjust from the 2020 experience (i.e., PBM ingredient cost payments to pharmacies were equivalent to AWP – 87.9%, WAC – 25.6%, and NADAC + 63%), we may estimate the role of benchmark price changes to spending by taking the total value of each benchmark, in each year, and multiplying by the 2020 discount equivalent. What we observe, in **Figure 22**, is that over the subsequent three years (2021 to 2023) there were significant aggregate payment differences attributable to the value of the benchmark price deflation. Said differently, in **Figure 23** (on the next page), we're setting equivalent payment rates to each benchmark based upon 2020 values (hence the 2020 bar showing no difference in payment regardless of which benchmark we're using). However, over the course of the next few years, the fact that some benchmarks deflate faster than others aggregate to savings that certain benchmarks (i.e., WAC and NADAC) recognize that others

(i.e., AWP) do not. All told, the difference between a payment rate at 2020's AWP discounts and one at 2020's NADAC rate would result in $327 million in savings with NADAC ($2.2 billion in total payments at AWP vs. $1.8 billion total payments at NADAC).

Figure 23: The Role of Drug Price Benchmark Deflation on Estimated Future Pharmacy Payments



Return to our earlier example of generic pricing impacts applied to the car market (**Figure 21**). If it had been a few years since you bought your last car, and proceeded to make a purchase decision based upon when you last bought a car, **Figure 23** suggests you're likely ill-equipped to purchase a car today (if you use the discount you expected to get a few years ago). We feel that **Figure 23** is of greatest value to plan sponsors who are evaluating PBM pricing guarantees. Plan sponsors often sign multi-year deals for PBM services. As a result, their contract with their PBM often sets pricing terms for the next three or more years (the typical length of a contract is approximately three years). This means that a contract that may seem competitively priced at its onset – as the 2020 value in **Figure 22** may represent – can lose value over time. To combat this, some plan sponsors may succeed in securing escalators in their contracts. An escalator, typically no more than 0.5%, would say AWP for generic drugs was guaranteed at AWP – 87.5% in 2020, would increase to AWP – 88% in 2021. However, these escalators can often be insufficient. For example, the relative gap between AWP and NADAC suggests that from 2020 to 2021 a 0.5% escalator on AWP would produce approximately $30 million in reduced price. However, NADAC – which as a reminder is a good proxy for the actual underlying cost of medicines – deflated at over 10% (equivalent to nearly $40 million in price reduction). Note that the AWP contract with an escalator of 0.5% was $10 million more expensive than the NADAC contract in this example (or 33% more expensive). The results of deflation compound over time such that at the end of a three-year period, the reality of drug

pricing can be very divergent depending upon the frame of reference of whichever drug pricing benchmark you are relying on.

Attempting to Understand How Drug Prices Change at Retail Pharmacies

Thus far, our analysis has focused on the role of drug prices (manufacturer, PBM, and pharmacy set price points) on reimbursement rates to retail community pharmacies, and as a corollary, the PBM-set point-of-sale price. We have observed that manufacturer list prices cannot fully explain the experience at the pharmacy counter. For both brand and generic classes of medications, drug prices at the point-of-sale were more varied than drug list prices would allow. From there, we observed that PBM intermediaries appear to be responsible for many of the pricing irregularities. This is because PBM-created payment rates (i.e., MAC), as identified based on the basis of reimbursement determinations provided by PBMs, were the most commonly observed payment basis within claims in our study. While PBM-created payment rates were the majority of overall claims (greater than 60%), they dominated generic drug claims to a greater extent than brand claims. However, brand claim payment rates were still variable in relation to the manufacturer list price, as reflected in different discounts to AWP, even if the payment rate was not described or determined via a "MAC rate." Said differently, it wasn't a fixed discount to the manufacturer list price for brands; therefore, the intermediary setting the discount played a role for the brand price experience as well.

As a result of our understanding of drug pricing dynamics thus far, we next wanted to attempt to better understand the role market forces may play in shaping drug costs. As we did with retail community pharmacy claims in the beginning, we start our analysis in this section by attempting to control what external forces may exist.

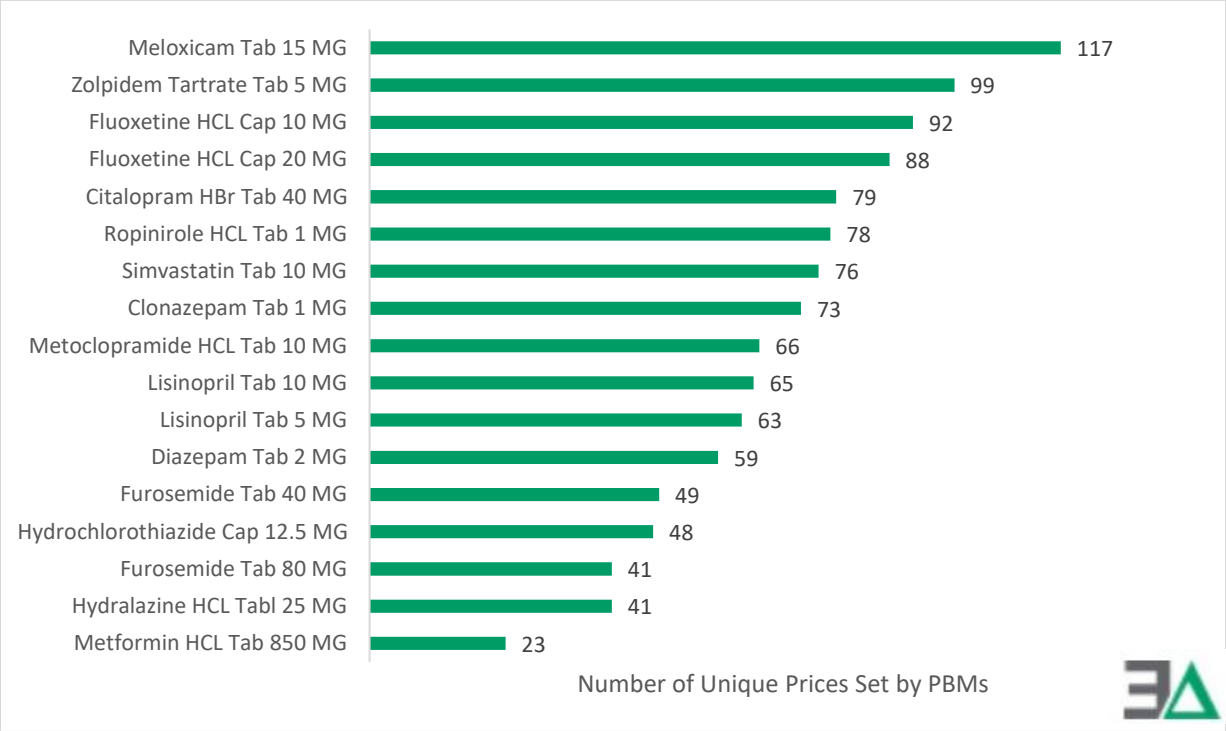
Payment Changes without Underlying Drug Acquisition Cost Changes

To begin this analysis, we identified all generic drugs on a product equivalent basis from our study pharmacy data set in which the underlying acquisition cost did not change for all of 2020. We're using NADAC to measure the acquisition cost, as it is the publicly available pricing benchmark based on continuously surveyed pharmacy invoice acquisition costs. In other words, this analysis is predicated on drugs where, for all of 2020, the NADAC price did not change.

To ease comprehension, the results were limited to drugs with at least 10,000 billed prescriptions across all study pharmacy claims in 2020 (to make visualizing the data easier). From there, we assessed how many unique unit price points over 2020 existed for each drug. If PBM-set MAC payment rates for generic drugs are intended to objectively reflect the actual costs of medicines and incentivize the most efficient generic purchases (while not disincentivizing purchases either, which could occur if the PBM MAC rate is set below possible pharmacy acquisition costs), then we would not anticipate variability across these drugs. Said differently, and with an example, there would be one best price point for metformin 850 mg that would incentivize efficient pharmacy purchases. If that PBM-set MAC price is closely related to the drug's actual acquisition cost (which seems like it would need to be to create the proper incentives), and we know there was only one prevailing acquisition cost price point for this product for the entire year of 2020, it stands to reason that PBM pricing variability for these products should be minimal. As can be seen in **Figure 24** (on the next page), the average number of unique prices for these products was 68, ranging from a low of 23 prices to a high of 117. In other words, although NADAC informs us that the acquisition costs for these drugs

were unchanged in 2020, PBMs in our study set a lot of varied prices for this selection of drugs. Said differently, if PBMs are the experts in drug prices, that they are intended to be, they appeared to struggle with the price setting exercise for arguably the easiest drugs to set prices for in 2020 (given their unchanging acquisition cost according to pharmacy surveys [i.e., NADAC]).

Figure 24: Unique PBM-Set Prices for Generic Therapies whose NADAC did not Change in 2020 (Minimum 10,000 Claims)

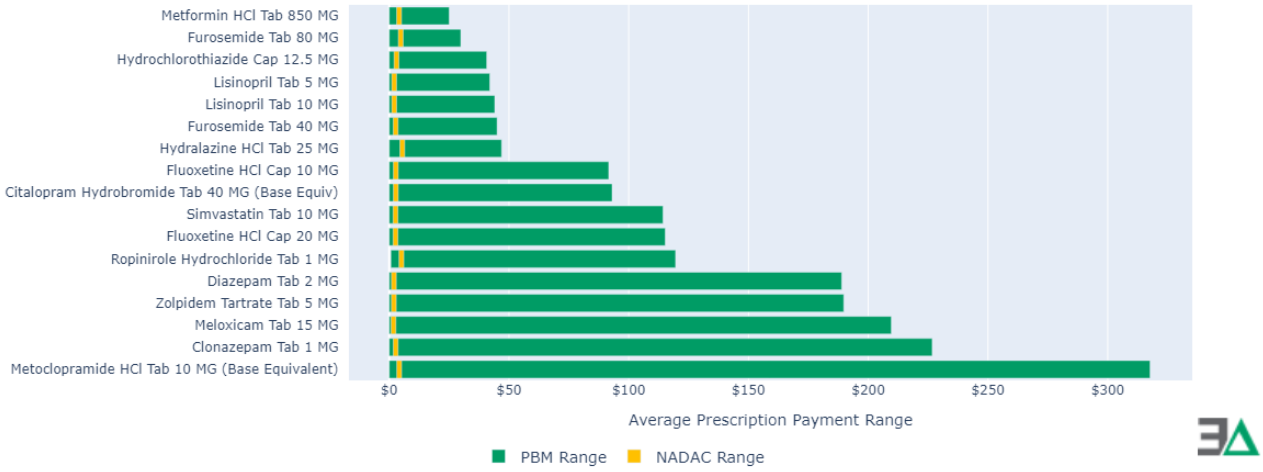


While **Figure 24** informs us that there were more PBM price points than we may have anticipated, it does not inform us of the value of those price differentials. To better appreciate the financial incentives being offered from PBM reimbursement for these drugs, we set out to analyze how varied the price points for each drug were in relation to the underlying drug acquisition cost (as represented by NADAC).

To perform this analysis, we began by identifying the difference in the PBM-set drug ingredient cost reimbursement between each unique unit price point for each drug relative to NADAC. Because many of the NADAC costs are small (less than $0.10 per unit), we multiplied the resulting differences by the average number of units per prescription for each drug so that we might evaluate the impact of pricing differentials on a representative claim basis. From there, we graphed the minimum to maximum amount of PBM reimbursement retail pharmacy claims from our study experienced for these drugs in 2020. We did this by setting the lower end of the green bar (i.e., left most point on the bar) equal to the average quantity for the drug multiplied by the lowest ingredient cost paid per unit observation within our studied pharmacy data. We then set the high end of the green bar (i.e., right most point on the bar) equal to the average quantity for the drug multiplied by the maximum ingredient cost paid observation. A NADAC bar was added using the same approach (though no range existed since NADAC was

unchanged for these drugs). Ultimately, the results of this analysis and graphing exercise are displayed within **Figure 25**.

Figure 25: Generic Pharmacy Price Range for Drugs with No Change in NADAC, Studied Pharmacy Claims (2020)



If it looks odd that all the green bars for these drugs start at zero, well that is a result of rounding where the minimum average unit price is less than $0.01 per unit and so multiplication by the average units for these prescriptions (most are 30 pills or less) is resulting in an effective $0 ingredient cost reimbursement (note that the dispensing fees on these claims are insufficient to really change the average payment observation for these drugs on the low end). Similarly, there is not actually a range in NADAC cost for these drugs, simply a trick of the eye from the thickness of the yellow line that is identifying the average acquisition cost per script for these drugs.

In interpreting **Figure 25**, recall that PBM payment rates for generic drugs are, in their own words, incentives intended to drive efficient purchasing behavior. (19) Therefore, this analysis can help us better contextualize the financial incentives being offered to pharmacy providers. We observe in **Figure 25** that the upper-end PBM-set price was routinely multiples of the lower-end price point for each of these drugs. The minimum observed delta from high-end to low-end was approximately a 30-fold difference in price (metformin 850 mg) despite a single acquisition cost (i.e., NADAC) for the drug for the duration of 2020. The maximum observed delta for these drugs was of course much higher (a more than 300-fold difference in price).

We believe **Figure 25** can help explain a common frustration with drug pricing at pharmacies. Because of the challenges patients report in affording drugs (see the introduction to this paper), it is not uncommon for patients to attempt to call pharmacies in advance of filling a medication and request a price quote. However, many are surprised to hear pharmacy staff respond that they cannot know what the drug price is until they bring in their prescription and they run it through their insurance plan. We do not believe pharmacies do this maliciously; however, as we have demonstrated thus far, drug prices set by intermediaries are often unpredictable, making the task of providing accurate price quotes to patients somewhat of an unreliable guessing game. Again, recall from our earlier duloxetine example, the same drug,

at the same pharmacy, on the same day, may have different price experiences such that past events are not reliable predictors of future drug price experience. **Figure 25** is reinforcing this concept of variable pricing. A 30-fold or more difference in price experience can make it very difficult to operate a business. Pharmacies would clearly be incentivized to try and seek out the highest payment ranges for each of these drugs while avoiding the lowest price experience. However, such incentives do not appear aligned with efficient sourcing of products. What justifies a 30-fold difference in price for metformin or a 100-fold difference in price for metoclopramide? To explore these, we will reframe our analysis to evaluate the drugs with the largest payment ranges from PBMs to pharmacies in 2020. We will compare these large payment ranges to the underlying acquisition cost (i.e., NADAC) to evaluate to what extent acquisition costs and payment may be related.

Greatest PBM Range in Payment Rate for Drugs (Largest Min to Max Gap from PBMs)

The prior section demonstrated that price variability can exist absent apparent acquisition cost volatility for select drugs. However, most generic drugs will have manufacturer price competition, resulting in multiple prices in each time range. This is further true when one considers that pharmacies may potentially get supplies of their medications from multiple sources (i.e., more than one wholesaler), which may vary their acquisition costs. To study the issue of variable drug pricing from a different angle, we identified the generic drugs that had the largest difference between their highest payment amount and their lowest payment amount by a PBM (greatest minimum to maximum payment gap). These drugs were identified by similar means to the prior section (taking the difference between the high and low PBM-set price in total dollar amount over the 12-month period of 2020). The top 20 drugs were then charted using the same process in the previous example, except each drug's NADAC was represented as a range (from minimum to maximum) to accommodate the various reported retail invoice pharmacy invoice acquisition costs (NADAC) throughout the year. The results of this analysis are displayed in the same manner as the prior section in **Figure 26**.

Figure 26: Generic Products with the Greatest PBM Payment Ranges (Min-Max Delta) within Studied Pharmacy Data (2020)

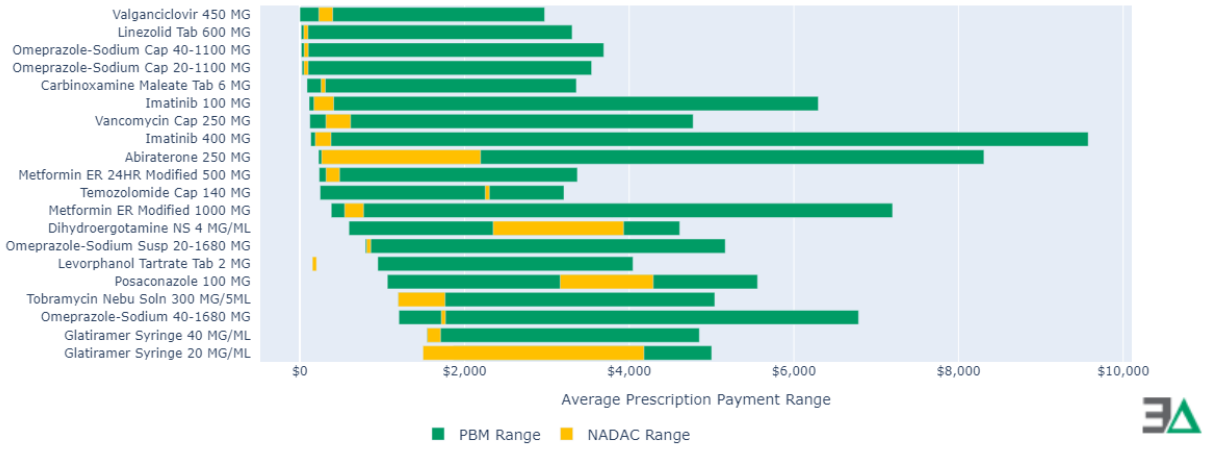


Figure 26 demonstrates that, for the identified products, PBMs often set price ranges that were significantly greater than the NADAC would suggest the price should be. If we accept that PBM payment is designed to be objective and encourage efficient purchasing of drugs, then these drugs in some way are the biggest example of where that incentive may not be aligned. Take for example temozolomide 140 mg (on **Figure 26**). We dove into the data and again found multiple billed claims for the drug from the same pharmacy provider, to the same PBM, for the same NDC, but different prices for the drug (but not on the exact same day, but in close proximity).

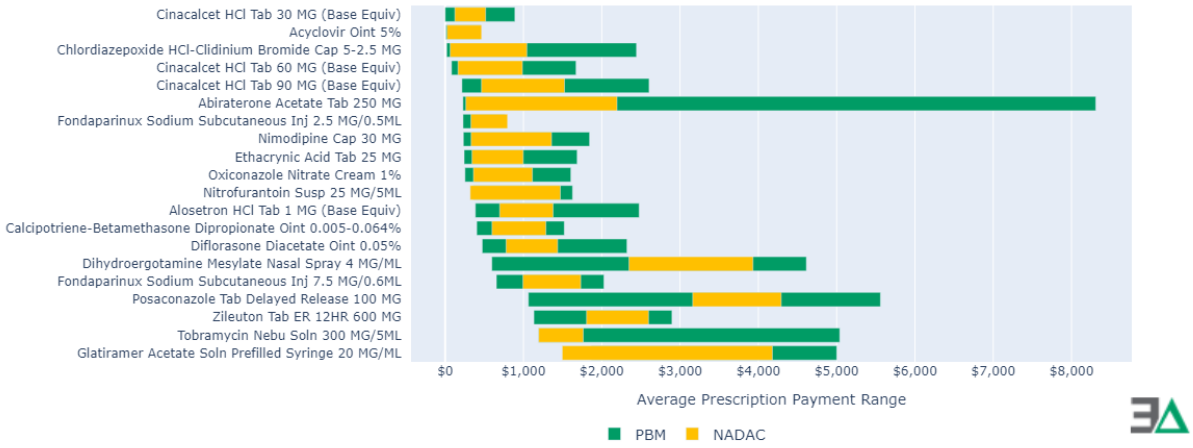
The first claim for temozolomide 140 mg was a MAC payment (according to the PBM's reported basis of reimbursement) of $1,204 for five tablets while two weeks later the same pharmacy, dispensing the same NDC, received a MAC rate from the same PBM of $100 for five tablets. This 12-fold difference in price occurred despite there being no change in NADAC price point over the same period (NADAC was $918.85 for five tablets). The $100 MAC rate represented an underpayment to the provider of over $800, but offered significant value to the member and health plan the PBM was servicing (assuming the health plan contract was pass-through).

However, **Figure 26** also demonstrates how great deals are "paid" for. Consider imatinib mesylate 400 mg in which the NADAC price for 30 tablets varied between $174 and $350 in 2020, a 2x range from high to low. PBMs priced 30 tablets of the drug between $123 to $8,880, a 72x spread from high to low. The average price set by PBMs to providers was roughly $3,000 per 30 tablets for a drug that had no greater than a $350 NADAC. Said differently, great deals (low drug costs) are paid for with higher drug costs on other claims. If we return to our temozolomide prescription (priced $800 below a provider's cost to acquire the drug), that price doesn't seem as valuable knowing that the average cost set by the PBM for imatinib mesylate 400 mg was $3,000 (or 10x its NADAC cost).

Greatest Acquisition Cost Range for Drugs (Largest Min to Max Gap from NADAC)

As way of testing our observations above, we decided to re-do the analysis, but focus this analysis on those drugs with the largest NADAC price range over the 12-month period in 2020. By analyzing the prices with the greatest range in acquisition cost at the pharmacy (as measured by NADAC), we could study how payment responded in the face of such variability. Given our observations thus far regarding pricing disparities, our expectation is that these prices would be subject to even greater disparities than the already identified products (as a result of the underlying market conditions providing direct support for pricing changes). Again, the top 20 drugs are presented in **Figure 27** (on the next page).

Figure 27: Generic Products with the Greatest NADAC Ranges in Studied Pharmacy Data (2020)



In **Figure 27**, we observe that the average difference from minimum and maximum NADAC was 3.5x over the course of 2020 for these drugs. In response, PBM payment rates, and thus the price established at the point-of-sale, for these drugs had a difference of 4,467x (or were approximately a thousand-fold as variable as the underlying cost would suggest). All told, this level of variability may be explained by the dynamic nature of the underlying market, with business operations partly explaining the gaps (i.e., timing differences between NADAC prices and PBM updates to drug prices). However, it is difficult to reconcile the differences in **Figure 27** with the differences in **Figures 25 & 26** previously. Taken together, these analyses suggest that the least amount of PBM payment variability occurred when the underlying cost of drugs was most variable (and arguably most justified large payment ranges). It is difficult to reconcile why this would occur if only drug manufacturer list prices were responsible for influencing retail drug prices.

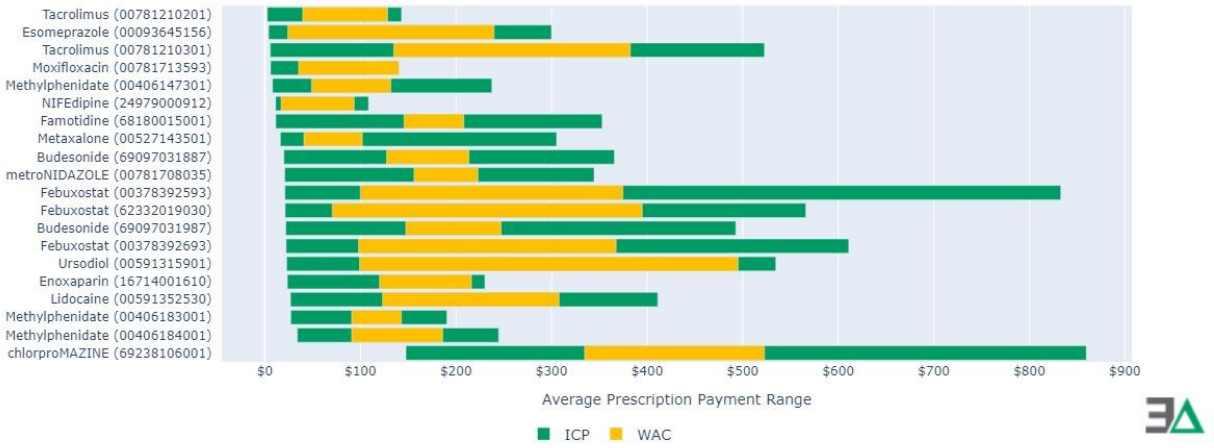
Greatest List Price Range for Drugs (Largest Min to Max Gap from WAC)

At this point, we feel it necessary to revisit manufacturer-set prices. We cannot claim above that it is difficult to reconcile our observations regarding pricing variability without evaluating how PBM-set prices, as represented by their payments to pharmacies, responded to changes in manufacture-set prices. As way of evaluating this, we decided to re-do the analysis, but focus this analysis on those drugs with the largest WAC price range over the 12-month period in 2020. Because we are relying upon WAC for this analysis, we have to be NDC-specific. This is because WAC prices are set on an NDC-basis by the manufacturer whereas NADAC is set the same across NDCs for all equivalent (or interchangeable) products. (45) Note, MAC rates from PBMs are also theoretically the same across interchangeable products to properly incentivize the proper acquisition of generic drugs (per their own definition).[xiv] (19) Regardless, for this analysis, we're identifying ranges based upon the published WAC price for the product within 2020 and identifying the top 20 products with the largest gap between the lowest and highest WAC. As can be seen in **Figure 28** (on the next page), we are again observing that PBM

[xiv] We say theoretically because our observations within this paper do not support equal assignment of MAC rates across equivalent NDCs.

payment ranges far eclipse the range the underlying WAC would appear to support. Specifically, the WAC range for these products averages 2.23x whereas the PBM payment rate was 26.81x.

Figure 28: Generic Products with the Greatest WAC Ranges in Studied Pharmacy Data (2020)



While we think **Figure 28** is useful to our broader understanding of the degree to which pharmacy reimbursement is tied to manufacturer-set prices, we hesitate to give the analysis too much weight because as we acknowledged, PBM MAC rates are supposed to reflect market conditions and incentivize pharmacy purchases to the lowest acquisition price. If a PBM set low prices for these NDCs, it may be that they are trying to encourage pharmacy sourcing of alternative, and theoretically cheaper, equivalent products. However, that does not discredit that it is clear from the above that manufacturer-set price points cannot explain the price points experienced by plan sponsors, patients, and pharmacies for the above claims.

Evaluating Price Differences by Payer Types

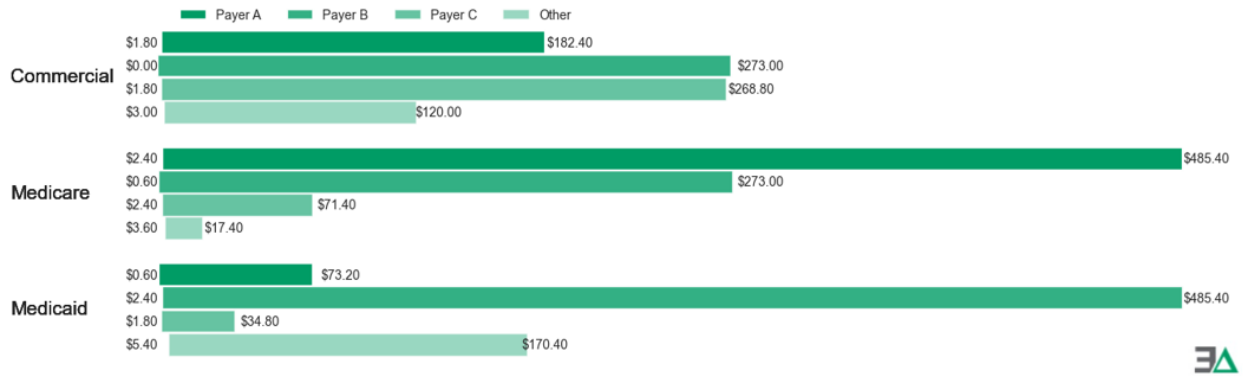
We have thus far evaluated PBM payment rates across all lines of business. We did this under the concept that PBMs claim that their proprietary payment rates are designed to incentivize the lowest acquisition cost products. If this was true, then we would expect that PBM payment rates would function like NADAC (the same price point for all equivalent NDCs of the drug). However, our analyses have made it clear that is not what is happening. That said, we recognize that not all lines of PBM business operate within the same set of requirements or incentives. For example, prescription drugs within the Medicare program may be subject to Direct and Indirect Remuneration (DIR), which in turn may lower final drug payment beyond what is observed at the point-of-sale. To be clear, the regulations for Medicare state that the retail price at the pharmacy counter, known as the negotiated price, is required to be "the costs for prescription drugs agreed upon through direct negotiation between the Part D sponsor or an intermediary contracting organization, such as a pharmacy benefit manager (PBM), and the pharmaceutical manufacturer." (46) While we acknowledge that DIR is likely to play a role in some of the Medicare observations, it seems unlikely that a reasonable justification could be provided that would say negotiated costs for prescription drugs at the pharmacy counter would be significantly different from one line of business to the next, particularly when most

PBMs are operating within all payer type environments. Said differently, if the PBM negotiates a price point for a drug in a commercial contract, nothing within Medicare's design would seem to justify the negotiated drug ingredient cost rate for Medicare being significantly different for that same drug product. If there was a compelling reason to pay providers differently from one line of business to another, this could be done in a straightforward manner by paying higher dispensing fees or adding bonus incentive payments to the pharmacy (as allowed for by the pharmacy claim standard), rather than manipulating the cost set for the underlying drug. Furthermore, the attention to drug manufacturer prices, and the increased desire for transparency around drug manufacturer prices (see state drug pricing transparency boards), would seem to suggest that the understood value of the product at the pharmacy counter would be clearer today than ever before. (47) (48) However, the data is not suggesting that clarity on drug pricing has been secured.

Regardless, we wanted to investigate whether lines of business appeared to play a significant role in the variability in our drug price observations within our studied pharmacy data. We struggled to come up with a way to properly assess the aggregate impact of payment variability between payer types (Medicare, Medicaid, and Commercial). At a minimum, the four different payer groups (PBM A, PBM B, PBM C, and Other), the three lines of business (Medicare, Medicaid, and Commercial), and top 20 drugs (the amount we've been looking at in the previous analyses) lead to 240 potential buckets to analyze. This would be visually too busy to properly display in a chart. However, for the purposes of this paper, we will explore this topic by using a singular drug example to hopefully ease understanding without making it too difficult to track each payer type, PBM, and drug relationship.

The drug pantoprazole 40 mg was the singular most dispensed product in our study pharmacy claims database from 2020. The average number of units per prescription was 60 pills, reflecting its typical dosing (two pills per day for a 30-day supply). We used the average number of units, times the observed minimum and maximum unit costs, to display the variability on an average prescription basis by PBM payer and line of business. The results are displayed in **Figure 29** (below). In reviewing **Figure 29**, it is helpful to note that the NADAC in 2020 for 60 tablets of pantoprazole ranged between $3.60 and $4.20 over the course of the year.

Figure 29: Pantoprazole Payment Variability (60 Tablets) by Payer and Line of Business, Studied Pharmacy Data (2020)



The observation for pantoprazole is demonstrative of how there was no clear determinant of pricing variability regardless of PBM or line of business. All but two of the 12 segments offered a low-end price that was below the NADAC minimum of $3.60 per prescription. At the same time, 10 of the 12 segments had a high-end price that was at least 17 times the maximum NADAC price of $4.20 per prescription.

As a result of our collective observations of price variability by source (i.e., acquisition cost, PBM, or manufacturer-set price point), it seems that more research will be needed to better determine how pharmacy point-of-sale prices change. While this study of drug prices has been far from exhaustive at this point, we feel reasonably confident that no universal or direct correlation exists between the point-of-sale price and the manufacturer's set price. In fact, where variability in drug costs might be reasonably expected to explain point-of-sale costs (such as when manufacturers are changing their list prices), there appeared to be less variability in those observations than in other areas (see **Greatest List Price Range for Drugs (Largest Min to Max Gap from WAC** compared to **Greatest PBM Range in Payment Rate for Drugs (Largest Min to Max Gap from PBMs** sections above). Ultimately, the lack of a clear relationship between a manufacturer's price and a point-of-sale price injects unnecessary volatility and adds to the confusion regarding how the prices yielded at the pharmacy counter are set, and for what reasons they change.

We recognize that many contracts within the drug supply chain are tied to a discount on manufacturer list prices. As a result, it stands to reason that if manufacturers lowered their prices, then the drug prices at the pharmacy counter would also likely decrease. However, we feel that our analysis has demonstrated thus far that we could not reasonably predict to what degree they may decrease because we cannot readily tie the pricing experiences at the pharmacy counter to the manufacturer list prices. At the same time, we feel confident that our observations demonstrate that PBM payment rates appear to play a central role in determining retail drug costs. The basis for reimbursement for all claims appears effectively tied to PBM-selected payment methodologies.

For brand drugs, we observed this as variable discounts to manufacturer list prices (see **Basis of Setting Brand Drug Prices** section earlier). The observations for brand drugs largely inform our belief that should brand manufacturers unilaterally lower their drug costs, pricing relief for consumers would not be equitably felt (since each experience a degree of variability in secured brand discounts today). Similarly, for generic drugs, we observed that PBM MAC rates dominate the methods used to establish the price yielded at the pharmacy point-of-sale; however, they do not establish uniform prices for the same interchangeable group of generic drugs. Many generic drug claims within our studied pharmacy data have more than 100x differences in realized prices. This means that some patients and their health plans paid significantly more than others for the same drug therapy. Similarly, some pharmacies profited much more from a given generic claim than a competitor pharmacy filling the same product. With all this in mind, the final section of this report will explore the impact of the observed variability in drug costs to stakeholders within the drug supply chain.

The Impact of our Drug Pricing Observations to Drug Supply Chain Participants

Of the various stakeholders in the U.S. prescription drug supply chain, patients are likely the most directly impacted by our observations of drug pricing disparity in retail community pharmacies in 2020. While health plans and pharmacy providers certainly experience challenges related to business operations from the unpredictable nature of finances dominated by PBM payment and billing rates, they ultimately experience the aggregate nature of the reimbursement they receive. Meaning, that underpayments on some claims can be offset with overpayments on others, including across patients. A patient, on the other hand, may fill no more than a handful of prescriptions a year. This in turn means that patients do not benefit from the same degree of aggregation other drug supply chain participants experience. That said, while patients are the most likely individuals to experience the greatest potential harm from the disparities in drug prices, we cannot discount the impact of payment variabilities to all members of the drug supply chain. Therefore, we will explore the implications for each in the final sections of this report.

Impact to Pharmacies

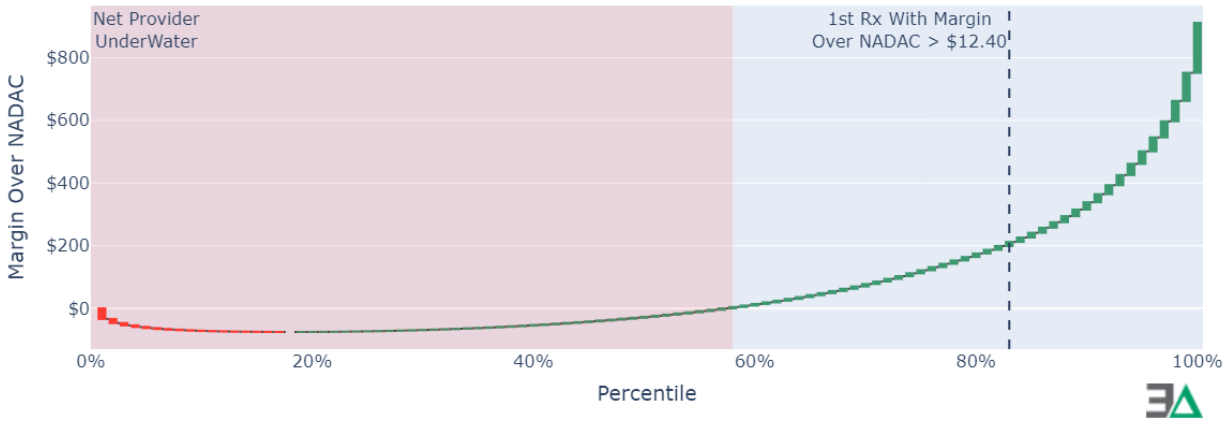
We begin our evaluation of the impact of drug pricing variability by analyzing the impact on pharmacy providers. It should be appreciated that while PBM negotiated rates with providers are the dominant basis for claim payments (i.e., MAC; see **Basis of Retail Drug Costs** section above), PBM-negotiated rates are only realized when the pharmacy provider's asking price (U&C) is greater than the price the PBM has valued the good or service. However, our data revealed that pharmacy providers rarely attempted to establish value through price competition. On average, less than 1 in 100 claims were based on the pharmacies' U&C price points (see **Basis of Retail Costs Attributable to Pharmacy Set Prices** section previously). We believe this observation is demonstrative of the first impact PBM pricing practices have on pharmacy providers; namely, PBM reimbursement practices disincentivize most retail pharmacies from setting lower U&C prices.

In order to understand the role pricing variability has on pharmacy incentives to potentially lower their asking price (U&C), we begin by reviewing our prior studies. In our 2022 study entitled, **Understanding Pharmacy Reimbursement Trends in Oregon**, it was identified that the average retail pharmacy experiences a significant range in the distribution in reimbursement over a basket of goods relative to their estimated cost to acquire those goods. (3) In simple terms, many claims were paid to pharmacies at rates that did not cover the underlying acquisition cost of the drug nor the overhead costs of running a pharmacy. At the same time, a relatively small group of claims provided significant margins to the pharmacy providers (i.e., 5% of utilization was responsible for over 50% of all profits). The significant variability in price and profit on any one transaction results in risks to the viability of pharmacy business. If high-margin claims become low-margin claims through lower U&C set prices by pharmacy providers, their business may not survive (given the relative importance of a small group of claims). While this report is less focused on the profitability of claims relative to their underlying costs, we have found largely the same phenomenon of pricing variability in this report.

More specifically, our prior work in Oregon demonstrated that over the average 100 prescriptions dispensed at a retail pharmacy, the average pharmacy provider experienced payment below acquisition cost (i.e., NADAC) on 17 claims. At this point, the provider had accumulated a net payment below the estimated cost of goods (i.e., NADAC) of $200. The next 58 out of 100 prescriptions were needed to reach a break-even point, meaning the pharmacy received enough profit to fill the holes left by the accumulated losses from those 17 underpaid claims. It was not until the 76th prescription that the provider began to generate a gross profit or revenue that exceeded the cost-of-goods sold (COGS). Ultimately, it was in the last five prescriptions (95th percentile and above) that the provider generated most of the profit. In fact, we found that the 5% of claims with the highest profits were responsible for 62% of pharmacies' total accumulated profit. (3) Not receiving the significant revenue above the underlying drug acquisition cost on these final few transactions would likely jeopardize the provider's longer term business viability. As a result, there is little opportunity, and great risk, to providers to alter their U&C prices downward.

To be more specific, we are able to confirm that the data used in this report matched our prior learnings from Oregon. Utilizing the same methods as we did for our Oregon study (see **Methodology** section) on the 32.6 million prescriptions from our studied retail pharmacy data set, we observe (in **Figure 30** below) that relatively few claims are responsible for the majority of pharmacy profits and therefore pharmacies lack an incentive to more aggressively set their U&C prices.

Figure 30: Estimated Margin Over NADAC by Percentile, Studied Retail Pharmacy Claims Data (2020)

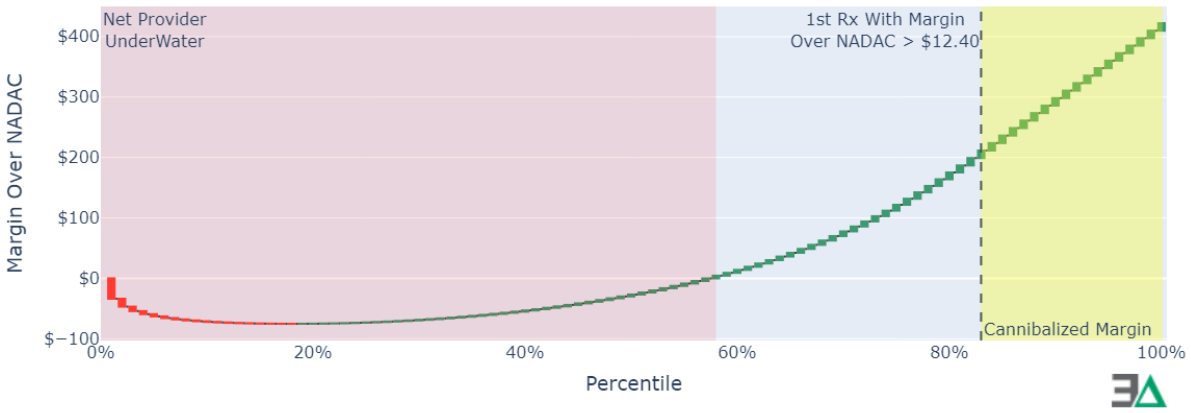


Based upon **Figure 30**, we can reasonably say that the pharmacy experience we identified in Oregon is representative of retail pharmacy claims across the country. To be specific, in **Figure 30**, we see that retail pharmacy claims were paid below NADAC on the first 18% of prescriptions (1% greater than our observation in Oregon) and that it was not until the 58th prescription (earlier than what was found in the Oregon study) that the provider broke even on their underlying cost of goods (based on NADAC). Overall, study pharmacies in 2020 experienced an aggregate payment rate of $9.11 over the NADAC acquisition cost. This is a few dollars better than our observations in Oregon; however, aligns to the generally accepted notion that pharmacies are receiving less margin year-over-year (as the Oregon study

examined data after 2020). As before, such payment experience relative to their underlying drug costs offers pharmacy providers little flexibility in setting their U&C costs.[xv]

To demonstrate the lack of incentive to lower U&C prices, we reran the previous analysis but assumed all providers set their U&C price to no greater than NADAC + $12.40 (the approximate upper end of drug acquisition cost + pharmacy operating expense). (25) The results of this analysis are displayed in **Figure 31** (below).

Figure 31: Estimated Margin over NADAC by Percentile, Payment No More than Assumed U&C (NADAC + $12.40) (2020)



In reviewing **Figure 31**, we note that most prescriptions were not impacted (all transactions before the yellow section). Specifically, 83% of transactions would not change in price (the existing negotiated rate was still lower than the pharmacies' assumed U&C price of NADAC + $12.40). In other words, pharmacies setting their sticker prices at a NADAC-plus-$12.40 equivalency provides the opportunity to impact just 17% of their claim volume (yellow section in **Figure 31**). However, the provider would reduce their gross margin by 54%, from $911 to $422 per 100 prescriptions. Said differently, pharmacies who lower their U&C would potentially be more attractive to 17% of their available customer base (through a lower price point) but would jeopardize over 50% of their gross margin to do so.

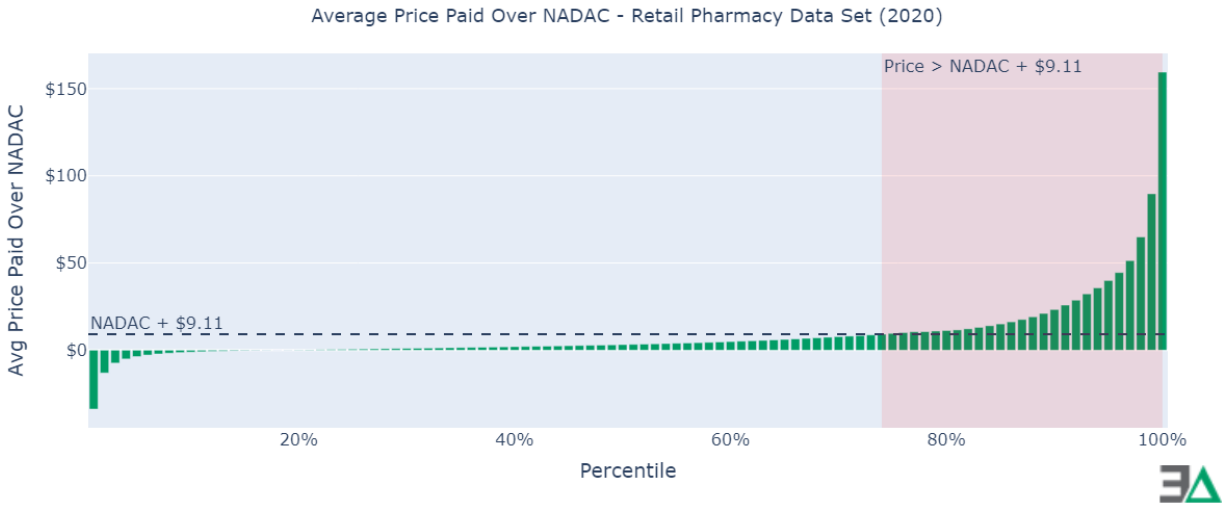
As a result, pharmacies, like most businesses, are likely to recognize significantly more value from getting the price right than attempting to grow volume. (49) Consider what we know about the pharmacy market. The retail pharmacy prescription market share of individuals who purchase drugs without insurance is estimated at 5%. (5) That does not represent a significant opportunity to grow volume, particularly if it comes at a cost of reducing existing margin by 54%. Therefore, for most retail pharmacies that accept prescription insurance, getting the price right (via the incentives of their largest customer, PBM payment rates) is arguably more valuable than attempting to grow volume. The more they compete against PBM payment rates (through lowering their U&C), the more likely they are to lose financially.

To drive home this point, consider that the payment paradigm within our studied retail pharmacy claims data set produced an average point-of-sale payment over NADAC (without

[xv] As we noted in our Oregon report, PBMs often require additional price concessions after the transaction is completed (i.e., DIR or effective rate reconciliations). At the same time, pharmacies also can obtain off-invoice discounts that may lower their cost to acquire drugs below NADAC. Neither event is reflected in **Figure 30**.

netting out retrospective PBM concessions or clawbacks) per prescription of $9.11 (**Figure 30** previously). However, very few claims actually transacted at this overall average rate. While it would be possible to replicate the actual experience with a model that paid a simple flat fee above NADAC at $9.11 one hundred percent of the time, the aggregate experience of such a model would actually increase costs on the majority of claims. As can be seen in **Figure 32** (below), when we identify the percentile of all claims relative to their cost above NADAC, roughly seven out of every 10 prescriptions were reimbursed below the overall average.

Figure 32: Average PBM Price Paid over NADAC, Study Retail Pharmacy Claims (2020)

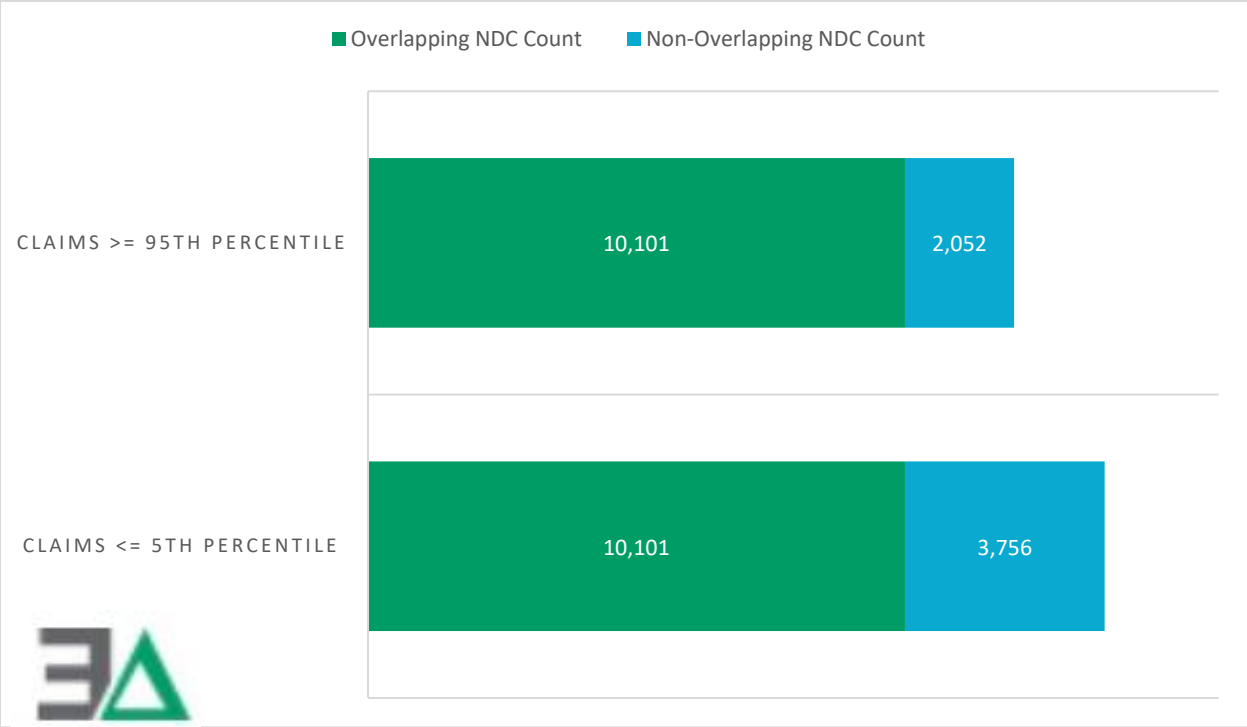


In reviewing **Figure 32**, we should appreciate that to convert all claims to a flat fee structure (one that would value the payment above the drug's acquisition cost universally the same), the majority of claims would increase in costs relative to their current experience. At the same time, the smaller number of claims that are above this flat fee structure would result in significant savings (over $100 per claim in some instances). This observation is consistent with our numerous examples of drug pricing disparities within this report. To be clear, the aggregate cost experience is unchanged for these claims, just the underlying and individual claim experience. Undoubtedly, many claims are securing very low drug and labor costs; however, those costs are only achievable if some pay exceedingly high costs. If our goal in drug pricing is to create incentives that encourage equitable treatment of all patients, the current paradigm does not appear to incentivize such an outcome (as there are apparent financial incentives to the pharmacy business to source certain claim types over others). However, the exact nature of those financial incentives can be difficult to ascertain.

The last observation we will make regarding the impact of our drug pricing observations onto pharmacy providers is that MAC rates do not, as PBMs claim, incentivize pharmacies to "purchase less costly generic drugs available in the market, regardless of the manufacturer's list price, since manufacturers will charge different amounts for equally interchangeable generic drugs." (19) To demonstrate why this incentive does not exist in practice, we compared the individual drugs (at the NDC level to control for potential manufacturer price influences) that fell in the lowest payment relative to NADAC (specifically, those at or below the 5th percentile) to those with the highest payment relative to NADAC (those in the 95th or above

percentile). We identified a total of 22,660 unique NDCs within the data set of which 13,827 unique NDCs were contained in the 5th percentile and below (61% of all NDCs), and 12,153 were in the 95th percentile and above (53% of all NDCs). All told, there were slightly more opportunities on an NDC level for a pharmacy to be underpaid than overpaid. However, when we compared the list of NDCs within both groups, we found that the total number of NDCs across both groups (≤ 5th and ≥ 95th percentile) was greater than the total number of unique NDCs in the entire data set. This result can only mean that there is overlap between the lowest and highest pharmacy payments on an NDC-level. This observation is startling because it appears in direct contradiction to the commonly held notion that only drug manufacturers are responsible for setting our drug pricing experience. All told, we identified that a total of 10,101 NDCs fell within both percentiles (44.6% of total observed NDCs) (**Figure 33** below).

Figure 33: Count of Overlapping Unique NDCs Between Lowest and Highest Percentile of Claims Payments Relative to NADAC, (2020)



Perhaps more than any other finding, this demonstrates how little manufacturer list prices can matter when it comes to the drug prices that are realized at the pharmacy counter. Across these experiences, manufacturers are providing only one set of drug prices for their product at an NDC-level and yet the actual prices yielded at the end of the transaction can be extremely varied. So varied in fact that they may be within both the best and worst paying claims, on a margin basis, for the pharmacy provider. If you're a pharmacy facing a business decision of which drug to source, what are these incentives sending your business?

Absent a more transparent market, pharmacies appear under-equipped to compete on drug prices within the current incentives of the prescription drug insurance marketplace. Losses incurred on some claims are not guaranteed to be offset by gains on other claims, requiring pharmacies to attempt to grow volume, even though returns on such growth are unknown.

Further complicating matters, our prior research – including the previously mentioned Oregon study – non-PBM-affiliated pharmacies appear to consistently receive disproportionately low access to overpaid prescriptions relative to PBM-affiliated pharmacies. The variability in drug payments day-to-day, even within the same NDC, creates a meaningful degree of unpredictability for pharmacy business operations. It is difficult to imagine that pharmacies can meaningfully control buy-side risk to their business when the underlying cost of the product sold seems to be of little influence on the sale price received from the PBM. The captured nature of the prescription drug market − where the overwhelming majority of pharmacy customers have insurance through a limited number of PBM suppliers for that insurance − compound the business risks to pharmacies. Such an environment may help to explain why many of the programs that get designed to save people money on prescription drugs are outside of the insurance marketplace. Whether you look to GoodRx, SingleCare, Mark Cuban Cost Plus Drugs, or other cost-plus pharmacy pricing models, these and other solutions generally require individuals to not use their insurance in order to secure better prices for medicines.

Impact to Health Plans

Given our exploration of the impact to pharmacies from drug pricing variability, and the conclusions regarding programs like discount cards and cost-plus pharmacies, the next logical impact assessment would seem to be the health plans. If prescription drug "deals" are increasingly found potentially outside the drug benefit, how might drug pricing variability be impacting health plans?

Regrettably, we generally lack the ability to study the effects of pricing variability on health plans, because there are not readily available data sources that reflect what cost the health plan ultimately incurred in relation to the transaction at the pharmacy counter (and what does exist in the public domain, we have previously explored in our studies of state Medicaid programs). (3) (26) Furthermore, even if the data of health plan costs was assumed to be pass-through[xvi] by the PBM, the contract between the health plan and the PBM may have contractual guarantees which could change net drug costs to the health plan (including an aggregate AWP effective rate guarantees, but also the value of retrospective price concessions, such as rebates). Said differently, it seems unreasonable to assume that the data available to us in this study can accurately reflect the health plan payment experience for these drugs.

While we suspect that many health plans would benefit from greater transparency into PBM pricing practices, potentially leading to more competitive drug acquisition costs for the plan and its members, we lack the ability to directly evaluate the role of pricing variability to health plans with the data available to us in this study. Therefore, we suggest that areas of future study focus on obtaining payer data and analyzing the role of pricing variability to health plans.

Impact to Patients

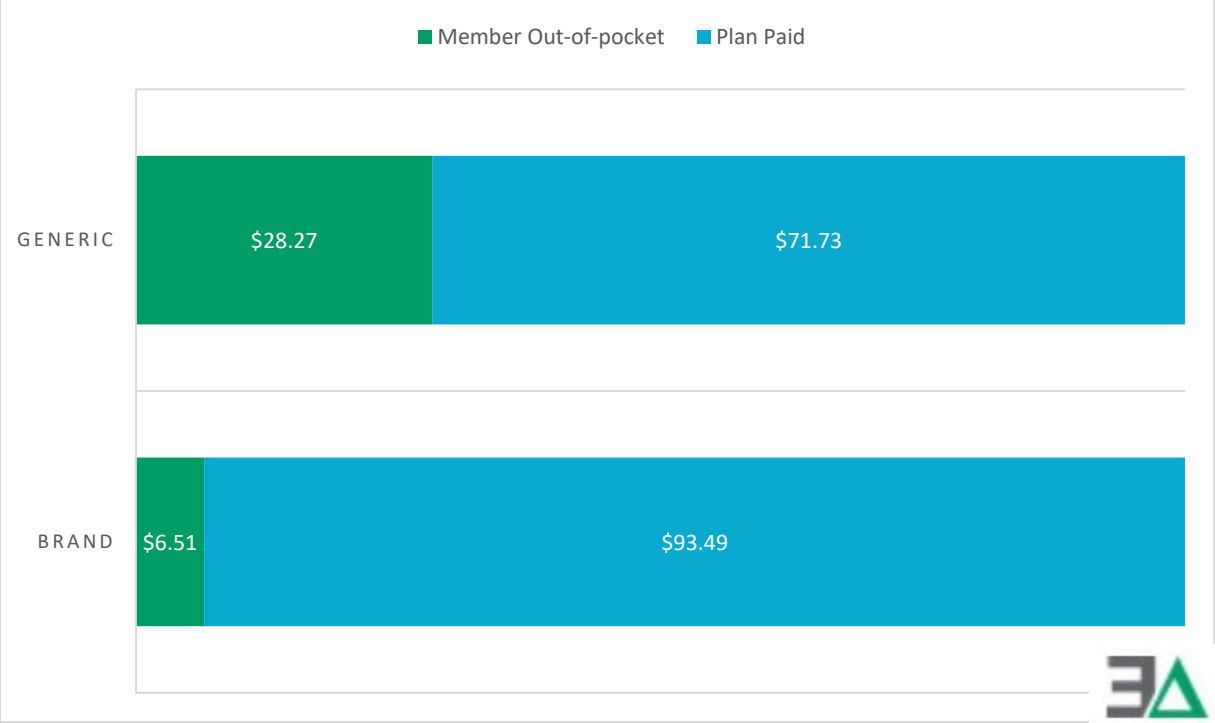
Pharmacy claims data – like the retail pharmacy data used in this study – does give us the ability to directly study the role of drug pricing variability on patients. As previously identified,

[xvi] Pass-through arrangements between PBMs and health plans require that the cost the health plan incurs is equal to the price paid to the pharmacy (i.e. no hidden markups or other forms of "spread").

pharmacy claims include fields that detail which costs are to be incurred by patients and which costs are to be incurred by health plans via their PBM. This data is necessary, as the pharmacy is responsible for collecting patient cost-sharing obligations directly (i.e., at the pharmacy counter). As a result, we begin our evaluation of the impact of pricing variability on patients by first assessing the degree to which members share in the aggregate drug costs within our study retail pharmacy claims data.

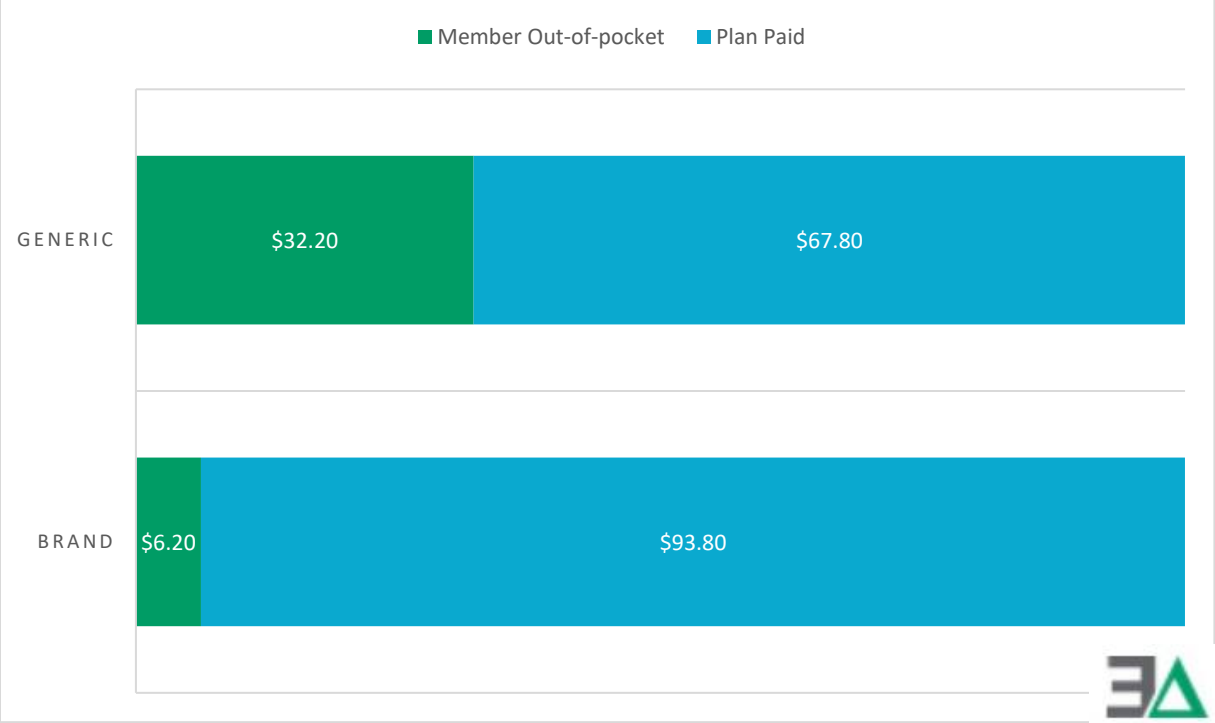
We start this analysis as we did our **Basis of Retail Drug Costs** section, by evaluating member cost sharing amounts between brand and generic drug claims. As previously discussed, generic drugs are generally of lower cost than their brand counterparts; therefore, health plans and PBMs are generally understood to try to incentivize generic use (to generate drug cost savings). However, we were surprised to observe that despite the lower retail price, covered patients are expected to pay a larger percentage of the PBM-set retail price for generic drug transactions. More specifically, when we compared the percentage of patient cost share for generic drugs relative to brands, we found that patients were asked to share more of the generic claim's costs than the brand's claim costs. Overall patient cost sharing in our 2020 study retail pharmacy claims data set was 68% more for generic drugs than for brand drugs ($170 million vs $101 million), despite generic drugs representing 28% of overall spend ($600 million of $2.16 billion). While it is true that generic drug claims make up approximately 9 out of 10 retail transactions − and therefore may be expected to have aggregate more cost share (due to their much higher utilization) − our data suggest that when controlling for proportional drug expenditures, members are responsible for a greater portion of retail generic drug costs than a brand. Specifically, as can be seen in **Figure 34** (one the next page), **for every $100 of gross spending on generic medications, beneficiary cost sharing was $28.27, while for every $100 of gross spending for brand drugs, beneficiary cost sharing was $6.51.**

Figure 34: Comparison of Member Out-of-Pocket Drug Costs, Brand vs. Generic (Studied Pharmacy Data, 2020)



In reviewing **Figure 34**, we first consider the potential value to patients if cost sharing amounts were normalized by drug class. If patients were responsible for just the 6.51% average retail cost sharing observed for brand drugs, cost sharing incurred by patients within our retail community data would be reduced by 78%, from $170 million to $39 million. However, we should recognize the potential role of manufacturer copay assistance to confound these observations. It is not uncommon for manufacturers to offer copay support programs for members to reduce their out-of-pocket expenses and make brands more affordable. We attempted to control for this variable by re-analyzing our data to just the Top 3 PBMs. This should remove any coupon support programs for brands from our observations (absent any potential PBM-led manufacturer coupon programs). As can be seen in **Figure 35** (on the next page), the results for this more limited view of drug class impact on cost sharing are 6.2% for brand drugs and 32.2% for generics.

Figure 35: Comparison of Member Out-of-Pocket Drug Costs for Top 3 PBMs, Brand vs. Generic (Studied Pharmacy Data, 2020)



To attempt to analyze this further, we removed all claims from our analysis in **Figure 34** where the patient cost sharing amount was $0 (i.e., Workers' Compensation, Hospice, and many Medicaid claims). Said differently, if patients do not have a financial incentive within the transaction, perhaps that would explain why the brand and generic disparity looks like it does in **Figure 34**. The results of this analysis were that the share of patient drug costs for generic drugs grew from 28.27% of costs to 37.8%. This means that when patients are paying for drug costs, they're likely exposed to more cost sharing than we would otherwise expect. In our view, this further enhances our understanding of drug pricing disparities, as not all plans confer equitable cost sharing amounts onto patients. Said differently, the disparity in patient cost sharing amount may signal that some people are more entitled to access low-cost medications than others. If one patient can secure Eliquis®, a medication to prevent complications from blood clots, at a significantly lower price point than another, then that patient is more likely to be better protected from these complications (given the relationship between patient cost share and adherence). (50)

Based upon our observation with $0 claims and increased cost sharing amounts, it seemed natural to next explore how costs were experienced when patients were responsible for 100% of the total prescription claim cost (i.e., their health plan did not help pay for any of the total claim's cost).

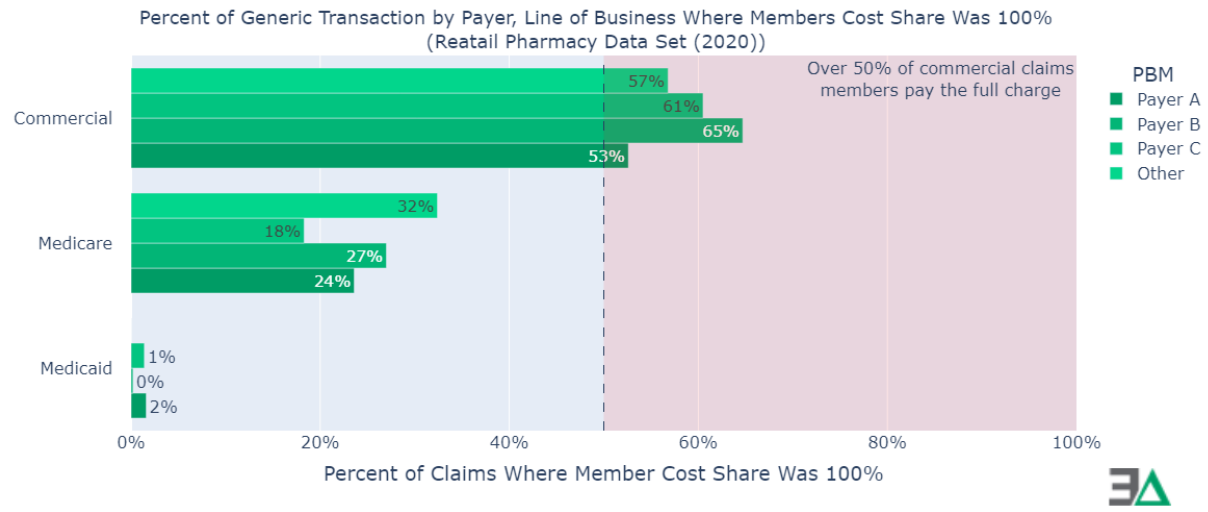
Prescription Claims where Patients Incurred 100% of the Cost

Because of our observations of the higher proportional share of drug costs borne by patients, alongside the potential variability that can exist in any given drug's price at the pharmacy, claims where the covered beneficiary is responsible for 100% of the total costs are obviously

the area where patients face the greatest risk from drug pricing variability. Recall that we have already observed many of the same drugs (at the NDC-level) are priced significantly differently. Large variabilities in price may impact prescription affordability. For example, patients may assume that they cannot afford their prescribed medication, based on prior experience or reports of high drug costs from friends and family, and therefore never begin therapy in the first place. Members already on drug therapy may struggle month-to-month to afford their medicines if price is variable, such as making it difficult to budget for upcoming drug costs. Research already suggests that nearly 20% of adults have reported not filling a prescription due to cost. (51)

To begin our evaluation of prescription drug claims where beneficiaries were responsible for 100% of claim cost, we determined what portion of overall generic fills these claims represented. Within our studied retail pharmacy data set, we identified that just over one-third (34%) of all generic drug claims required the patient to pay the full claim costs. To better understand these claims, we constructed a horizontal bar chart identifying these claims. In **Figure 36**, the y-axis breaks out each line of business, with each bar representing different PBM activity. The x-axis represents the percentage of overall claims with 100%-member out-of-pocket cost.

Figure 36: Percent of Studied Retail Pharmacy Generic Drug Claims by PBM and Line of Business where Beneficiaries were Responsible for 100% of Total Claim Costs (2020)



Unlike prior observations in this report, the manner by which patients obtain drug insurance seems to be heavily influential to the phenomenon of patients bearing full generic drug costs. More so than any other group, **Figure 36** demonstrates that commercial beneficiaries were most frequently exposed to full claim costs. **Commercial insurance beneficiaries paid the**

entire PBM-set price 59% of the time (5.9 million of 10 million claims), while Part D beneficiaries were impacted to a lesser degree at 25% (4.3 million of 17 million claims).[xvii]

At first glance, **Figure 36** may help explain the growth of GoodRx, SingleCare, and other cash-based pharmacy programs (such as Freedom Pharmacy and the Mark Cuban Cost Plus Drug Company) over the last several years. (52) If the majority of patients have prescription drug benefits through their employer, *and* the majority of those individuals (based on **Figure 36**) are paying full drug prices without financial support from their health insurer and PBM, *and* many drug prices can be exceedingly high through insurance relative to the underlying drug's costs, *then* we can better understand why there is a growing demand for solutions targeted at lowering costs at the pharmacy counter for patients. (53) However, structural differences in the regulations regarding Commercial, Medicare, and Medicaid claims may also provide a rationale to the observations of **Figure 36**. Consider the following (on the next page):

For Medicare Cost Share Amounts:

- The 2020 maximum Part D plan deductible was $435, while the average commercial beneficiary deductible was estimated at $1,644. (54) Higher deductible thresholds result in more claims where a patient would be exposed to paying the entire PBM-set price at the pharmacy counter. This is because the deductible represents the period of time when patients are responsible for full drug costs, without the financial support of their health plan. In turn, the nearly four-fold difference in typical deductibles between commercial and Medicare plans may explain some of the gap observed in **Figure 36**. The gap may continue to grow if commercial health plans increase use of High Deductible Health Plans (HDHPs). (55)
- Part D transactions from our study sample included Limited Income Spending (LIS) members. LIS networks are Part D plans where the federal government subsidizes benefits where enrollees who qualify based on need receive funding from Social Security to offset premium and cost-sharing expenses. Benchmark LIS plans do not have deductibles, resulting in another reason why the Medicare patients are less likely than commercial to bear full generic claim costs (as seen in **Figure 36**). The number of beneficiaries who qualify for LIS networks is considerable. In 2020, 14.1 million of 46 million Part D enrollees received some degree of subsidy (30%). (56) (57) Absent these members, where Medicare (and not the patient) is effectively paying the patient cost share amount, cost sharing proportionality between Medicare and Commercial may look more similar.

For Medicaid Cost Share Amounts:

- In regard to Medicaid, state governments are constrained in regard to cost sharing amongst what can be imposed on patients. In general, these cost-sharing amounts cannot exceed $8 per prescription. (58) Given that pharmacies incur a labor cost in the estimated range of $12.49 per prescription according to pharmacy cost of dispensing studies, the statutory limits on member cost sharing in Medicaid ensures that nearly

[xvii] In 2020, 14.2 million Medicare enrollees were in the Low-Income Subsidy (LIS). This is approximately 30% of all Medicare members with drug coverage. Medicare LIS members have limited (often zero) cost sharing obligations, which is likely influencing the observations in **Figure 35**.

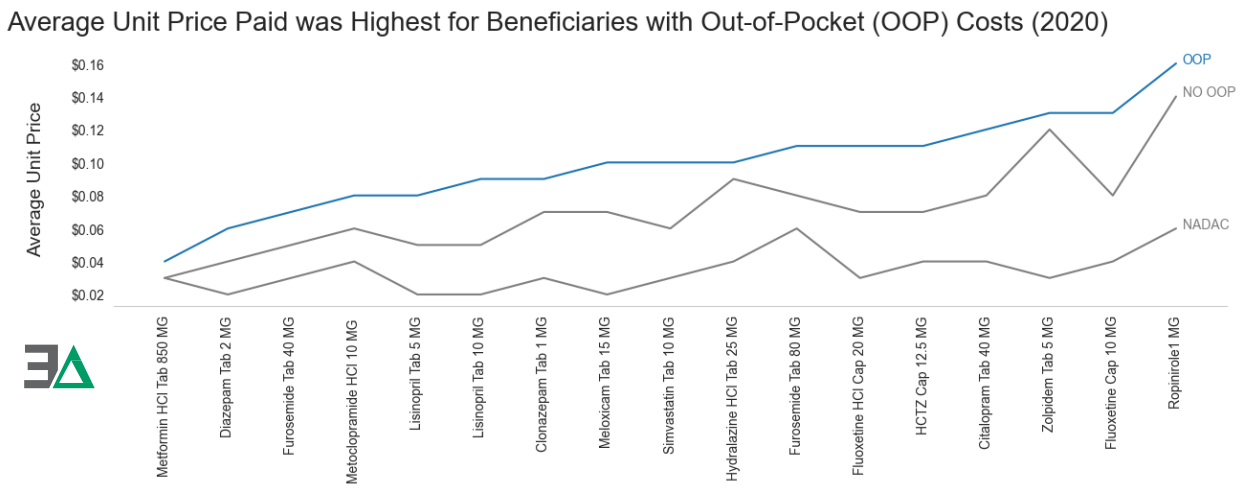
every claim has at least a portion of drug costs covered by the health plan (and so would not be included in an analysis of 100% patient cost share claims). (25)

Beneficiary Cost Share Relative to PBM Price

While the above demonstrates that member cost sharing was greater as a percentage of point-of-sale price for generic drugs when compared to brands, we have also identified that PBMs set many different prices for the same generic drug. To test if patient costs may impact the retail price PBMs set, we re-visit our earlier exploration of the 17 drugs where we observed PBM price changes despite a lack of change to the underlying drugs' cost (see **Figure 25** previously). Recall that these drugs lacked a known change in their acquisition cost in 2020; however, there was still a noticeable degree of pricing variability for these drugs when set by PBMs.

What we found was that for each of the 17 drugs previously identified, the paid per-unit price was greater when patient cost share existed (**Figure 37** below). This means that the overall claim costs were higher when patients were asked to share in the costs compared to when patients were not required to help pay for the drug's cost.

Figure 37: Comparison of Drug Costs Based Upon Presence or Absence of Patient Cost Share, Selected Drugs (2020)



While far from conclusive, the data suggests that for at least some subset of drugs, the value of drug insurance is recognized to a lesser degree than others. Patients whose insurance plans are covering the full price of medications (i.e., requiring no patient cost sharing) can secure for themselves lower drug prices, for the same medications, than patients who are being asked to help share in drug costs (i.e., they are being required to pay more). Said differently, if the role of PBMs is to help health plans secure access to medications for their members, what rationale would support higher overall drug costs when more payers are involved in the transaction (plan and patient) in comparison to costs where members do not have to pay any amount (plan only)?

Simply put, the impact to patients from variable drug prices is that patients' experiences with drug costs are very different. Returning to the KFF survey data we used at the start of this paper, many people in the U.S. take drugs (62% according to the survey). More people say the cost of

prescription drugs are unreasonable (83%). And yet, the same people surveyed said, by a large majority (69%), that affording medications is easy. Perhaps the key to unlocking the paradox of our perceptions of drug pricing realities is to acknowledge that our prices do not appear to be real, tangible, consistent quantities. Rather, our system of varied drug pricing realities, secured through various drug pricing discounts (rather than mark-ups to objective underlying costs), means that we never truly know what drug prices are, and so cannot form a logically coherent opinion on whether drug prices are reasonable or affordable. Said differently, without the right context we cannot understand what drug prices mean.

Conclusion

Prescription drugs are in many ways the backbone of U.S. healthcare system. Whether a person is seeking treatment for a simple infection or complex diseases like cancer or multiple sclerosis, prescription drugs are the primary tools employed by our nation's healthcare professionals (or the goal of researchers who are looking to offer solutions for conditions without current treatments). However, informed debate over drug prices is challenging because the nature of drug prices requires layers of context.

For many years, the prevailing notion of drug prices has been that manufacturers, and manufacturers alone, are responsible for setting drug prices. This paper demonstrates that the actions of manufacturer price points cannot reasonably explain retail drug prices at independent, small chain, and mid-sized chain pharmacies. This is because the prices at the pharmacy counter are more variable than manufacturer-set price points. Moreover, we demonstrated that pharmacy-set prices (the other party responsible for directly supplying the medication) cannot readily explain the role of drug prices at the pharmacy counter. This is because pharmacy acquisition costs, nor their set U&C prices, readily correlate to the price at the point-of-sale. Rather, the role of intermediaries, such as PBM-negotiated rates and MAC lists, create a degree of variability in the drug pricing landscape beyond what can be explained by drug manufacturer or pharmacy prices. The studied claims data demonstrated that the same drug, dispensed at the same pharmacy, on the same day, can have multiple PBM-set prices.

Our current system of drug pricing is heavily reliant upon securing discounts against a drug's list price in order to avoid overpaying for prescription medication. In such a system, some will inevitably secure better discounts than others, resulting in drug pricing disparity. Such a system does not appear to assign value to transparency and accountability around the setting of drug prices. Said differently, it will likely always be possible to secure a greater discount on drug prices than we are getting today. Beyond simply securing better contract language leading to lower drug costs, the incentives of the system encourage, rather than discourage, artificially inflated list prices. As a result, our system is inherently inequitable.

A system predicated on securing discounts on purchases will always favor large purchasers relative to smaller. This in turn creates incentives to consolidate. To support lower price points, manufacturers frequently merge product lines into fewer and fewer facilities. This injects fragility into the system, as an issue at one facility can jeopardize access to entire product portfolios (see IV fluid shortage following Hurricane Maria). (59) To ensure that the aggregate experience of low reimbursed claims is offset with a sufficient number of profitable claims, pharmacy consolidation is incentivized. For example, no singular pharmacy experienced the aggregate results our study discussed because there was no shared ownership of all these pharmacies. Consolidation of pharmacy providers can make the dispensing of medications more fragile than it was before, potentially jeopardizing the conditions necessary to safely dispense and administer medications (see Ohio Board of Pharmacy investigation into CVS pharmacies following consolidation). (60) And whether through access issues related to the drug manufacturer supply of medication or the availability of a location to receive the medication from, patients are ultimately receiving an inequitable system of drug prices that does not appear related to the activity of either the manufacturer or the pharmacy provider.

Methodology

Data Sources

All analytics performed in this study were based on the combination of the following raw data sources:

- Transactional data collected from participating pharmacies
- CMS' National Average Drug Acquisition Cost (NADAC) database
- Medi-Span PriceRx by Wolters Kluwer Clinical Drug Information Inc
- CMS' Part D Information for Pharmaceutical Manufacturers

Transactional database

3 Axis Advisors obtained 43 million deidentified pharmacy claims from 1,276 retail community pharmacies representing more than 25 states between January 1st and December 31st, 2020. These claims were uploaded into an SQL Server. The raw data for each analysis was extracted from the SQL database, and the analysis portion was conducted using the Python programming language and the Pandas, Polars, and Duck DB libraries.

National Average Drug Acquisition Cost (NADAC) Database

NADAC was developed by the Centers for Medicare and Medicaid Services (CMS), "to provide a national reference file to assist State Medicaid programs in the pricing of Covered Outpatient Drug claims to reflect the actual acquisition cost (AAC) of drugs." [xviii] As such, NADAC's goal is to be the most comprehensive public measurement of market-based retail pharmacy acquisition cost.

NADAC is compiled by Myers and Stauffer on behalf of CMS. It is generated from a voluntary monthly invoice cost survey of 2,500 randomly selected retail pharmacies (with 450-600 respondents). After Myers and Stauffer completes its data processing and clean-up activities, it publishes the survey results at the National Drug Code (NDC) level on Medicaid.gov. As state Medicaid fee-for-service programs have shifted to an actual acquisition cost (AAC) basis to comply with the Covered Outpatient Drug Rule (CMS-2345-FC), many states have utilized NADAC as the primary proxy for acquisition cost. As such, we believe NADAC is the best publicly available pricing benchmark to approximate average pharmacy invoice costs. We relied on the NADAC database extensively throughout this report as our best estimate for a drug's actual acquisition cost.

Medi-Span PriceRx by Wolters Kluwer Clinical Drug Information

Medi-Span PriceRx is an online pricing and drug information portal developed by Wolters Kluwer Clinical Drug Information, Inc. (WKCDI). PriceRx offers one of the most extensive histories of drug manufacturer pricing, with NDC-level drug pricing dating back to the 1980s. PriceRx was the source of the raw data that we used for AWPs for our analyses. It was used to classify brand vs. generic status. Medi-Span information is not in the public domain and requires a subscription service to access the data and field descriptions.

[xviii] Center for Medicaid and CHIP Services & Myers and Stauffer LC. CMS Retail Price Survey National Average Drug Acquisition Cost (NADAC) Overview and Help Desk Operations. *Medicaid.gov Web site* https://www.medicaid.gov/medicaid/prescription-drugs/downloads/retail-price-survey/nadac-overview-operations.pdf

CMS' Part D Information for Pharmaceutical Manufacturers

CMS provides important information related to Part D program for pharmaceutical manufacturers. Included within this information is a list of BIN and PCN values unique to Medicare prescription drug claims processing according to the requirements of the Medicare Pharmacy manual. (61) This list of BIN and PCN values was relied upon to identify Medicare claims within the transactional data.

Data Transformations

Date was transformed and analyzed utilizing a combination of SQL and Python programing language. Python packages included but not limited to Pandas, Polars, Duck DB, Matplotlib, and Plotly js.

Uniform Data Set

Initial data was cleaned from various sources and combined into a single, standardized, database. The following transformations are demonstrative of how standardization was handled:

Source 1
Example cleanings and standardizations

```
select
   ClaimID claim_id,
    trim(BINNbr) bin,
    trim(ProcessorCtrlNbr) pcn,
    trim(SvcProviderID) npi,
    trim(GroupID) group_id,
    cast(DateOfService as date) dos,
    cast(DaysSupply as int) days,
    trim(NDC) ndc,
    trim(DAW) daw,
    cast(IngrdntCostPaid as money) icp,
    cast(DispensingFeePaid as money) dispensing_fee,
    cast(IncentiveAmtPaid as money) incentive_pd,
    cast(IngrdntCostPaid as money) + cast(DispensingFeePaid as money) + cast(IncentiveAmtPaid as money) as total_pd,
    cast(QtyDispensed as float) qty,
    cast(PatientPayAmount as money) member_oop,
    cast(UsualAndCustomary as money) u_c,
    PBM pbm,
    right('00'+ trim(BasisOfReimb),2) basis_of_reimburesement
from [Pharmacy Claims

where TransactionCode = 'B1'
and ResponseCode = 'P'
and (OtherCoverageCode is null or OtherCoverageCode in ('','0','0.00','00'));
```

Source 2

```
select
      bin,
      copay member_oop,
```

```
    date_filled dos,
    daw,
    [day supply] days,
    dispensing_fee_paid dispensing_fee,
    ndc,
    group_id,
    ingredient_cost_pd icp,
    cast(ingredient_cost_pd + dispensing_fee_paid as money) total_pd,
    npi,
    pcn,
    qty,
    [usual & customary] u_c,
into source 2
from #t1;

Source 3
select  *
into #t1   from
claims.source3
where year(date_of_service) = '2020'

select date_of_service dos,
    UNIQUE_CLAIM claim_id,
    ndc,
    metric_decimal_qty qty,
    primary_bin bin,
    primary_pcn pcn,
    primary_group_id group_id,
    primary_paid_amount + secondary_paid_amount + final_patient_pay_amount total_pd,
    final_patient_pay_amount member_oop
into source3
from #t1
```

The multiple source tables were then joined together to form a single database. The database was further processed to remove 2.6 million claim reversals and 3.3 million claims for lacking ingredient cost or dispensing fee payments, resulting in 37.1 million claims left for analysis. The nature of this analysis required detailed information regarding ingredient costs, dispensing fees, and basis of reimbursement determination that we needed to ensure that analyzed claims included the necessary data elements.

Segmenting Claims by PBM and Line of Business

We limited the final data set to the top six PBMs by overall claim volume. The top six PBMs accounted for 32.6 million claims, or 86% of total analyzed transactions. The six PBMs were segmented into the three largest PBMs **(PBM A, PBM B, and PBM C)** while the last three aggregated into a fourth grouping **(Other)**.

Each claim received a classification based on the line of business (LOB). The LOB was either Medicare, Medicaid, or Commercial.

1. Medicare claims were identified utilizing payment information from the CMS web page for manufacturers where a list of bank identification number (BIN) and processor control numbers (PCN) are provided (https://www.cms.gov/medicare/prescription-drug-coverage/prescriptiondrugcovgenin/pharma).
2. Medicaid claims were identified by accessing billing information obtained from each respective state's Medicaid website. In addition, any identifiers in billing information traditionally used to identify Medicaid claims were classified as Medicaid such as a processor control number (PCN) of 'MEDICAID.'
3. Any remaining claims were classified as Commercial.

Segmenting Claims by Type (Brand vs. Generic):

Currently there is no federal definition for what constitutes a brand or generic drug. Therefore, the following logic was utilized to classify brand vs generic drugs for the purpose of this work.

1. If a drug had an FDA application type of 'ANDA', the drug was considered a generic drug
2. If the FDA application type was Not Available and the Brand Name Code was 'G', then the drug was considered generic (based on it being marketed as a generic drug)
3. If a drug had an FDA application type of 'BLA', the drug was considered a brand drug
4. If a drug had an FDA application type of 'NDA' and the Brand Name Code was 'G' then the drug was considered a generic drug (based upon it being marketed as a generic drug)
5. All remaining drugs were considered brand drug

The following code is demonstrative of how this was handled within the dataset.

```
data.pl.when(pl.col('Drug_Application_Type_FDA') == 'ANDA').then('G')
        .when((pl.col('Drug_Application_Type_FDA') == 'Not Available') & (
            pl.col('Brand_Name_Code_BNC') == 'G')).then('G')
        .when(pl.col('Drug_Application_Type_FDA') == 'BLA').then('B')
        .when((pl.col('Drug_Application_Type_FDA') == 'NDA') & (pl.col('Brand_Name_Code_BNC') ==
'G')).then 'G') .otherwise('B').alias('b_g')
```

Joining Other Data Sources into Claims Data

Various benchmarks prices were joined into the data set. To accomplish the task, a database was created for each price of interest (NADAC, AWP, WAC). Regardless of the benchmark, the mechanics to create the databases were the same. For each benchmark, an effective date and termination date (including a default for currently active price points) existed for each NDC. Based on the date of service of the claim, the benchmark was joined to the data based upon an NDC match and the date of service claim falling within the effective date and termination date for each benchmark.

Medi-Span PriceRx provides not only pricing information, but a hierarchical drug classification system known as the Generic Product Identifier (GPI). The hierarchical classification system enables grouping of drugs based on a logical classification of characteristics.

Example: GPI for Lipitor Oral Tablet 10MG

Drug Group	39	ANTIHYPERLIPIDEMICS
Drug Class	39-40	HMG CoA Reductase Inhibitors
Drug Subclass	39-40-00	HMG CoA Reductase Inhibitors
Drug Base Name	39-40-00-10	Atorvastatin
Drug Name	39-40-00-10-10	Atorvastatin Calcium
Dose Form	39-40-00-10-10-03	Atorvastatin Calcium Tablet
GPI Name	39-40-00-10-10-03-10	Atorvastatin Calcium Tab 10MG

This GPI has 39 brand and generic NDCs associated with it

GPI image retrieved from https://www.wolterskluwer.com/en/solutions/medi-span/about/gpi

We joined in GPI assignment to all claims in the National Claims Database. The GPI assignment enabled comparing equivalent transactions regardless of manufacturer or NDC. The following code is demonstrative of how this process was handled.

```
SELECT a.*,

b.GPI

 from claims_database a

join medispan  b

on a.ndc = b.ndc
```

Approach to Analysis Based upon Standardized Claims:

We attempted to discuss ingredient cost both from a unit cost and average price per prescription perspective. This is because purchasers of prescription drugs may relate to price based on an average prescription price more so than unit costs, particularly when unit costs are small (i.e., $0.01). In doing so, we had to standardize the average quantity per prescription for any analysis in which average prescription price was utilized. This was done by calculating the mean quantity dispensed for a given drug (based on utilization from the data set) and then multiplying by the observed unit price by this standardized quantity to generate representative prescriptions for comparison and analysis.

For example, in **Figure 25**, the average quantity for each drug was determined by taking the sum of total quantity dispensed for a particular drug and then dividing by the total number of prescriptions for that drug. Next, the average quantity was multiplied by the unit price of interest to get the average price per prescription.

Effective rates, discounts, and guarantees are discussed throughout the paper. The calculation is the same regardless of nomenclature. The sum of the ingredient price paid is divided by the sum of benchmark or price of interest. The value is then subtracted from 1 to get the percent discount.

Limitations

As with all research, our report is predicated on the accuracy of the data provided. The degree that such data differs from actual market conditions will have a notable impact on our report.

Limitations of NADAC

NADAC's main limitation is that it does not include all off-invoice rebates that pharmacies may receive from wholesalers. Rebates lower the net cost to the pharmacy for many drugs and tend to be a percent discount off the invoice cost (if a pharmacy meets various generic purchasing targets with its primary wholesaler or pays its wholesaler bill on-time). As such, NADAC should not be viewed as a reflection of pharmacy net costs — these will vary depending on pharmacy size and wholesaler contract terms. Our analysis does not account for these price concessions to pharmacies; however, we feel this limitation is appropriately controlled when we consider Medicaid programs and CMS are aware of these price concessions, and yet still rely on NADAC as a measure of statutorily defined actual acquisition costs (AAC). Furthermore, it seems likely that if these prices concessions were to become known, then there would be changes to the existing dispensing fee calculations employed by states. Since our reliance on NADAC in this report is also reliant upon Medicaid dispensing fees at times, we feel this limitation is appropriately controlled.

A secondary limitation of NADAC is that the survey of retail pharmacies that it is based on is voluntary. Myers & Stauffer randomly selects and surveys ~2,500 pharmacies a month. Of this group, 450-600 pharmacies per month provide their acquisition costs, which become the basis for NADAC. Of course, to the extent that there are NDCs that have not been purchased by the 450-600 pharmacies that respond to the survey, NADAC will not capture these NDCs. In April 2017, CMS assessed the materiality of this limitation. They found that NADACs were calculated for approximately 96% of all Medicaid claim submissions: 87% of brand claims, and 97% of generic claims. This significant level of NDC coverage for generic drugs mitigates the risk introduced by the voluntary nature of the survey, in our view.

A third limitation of NADAC is that it represents a single acquisition price point although we know that pharmacies secure their products through different wholesalers and at different price points. However, we again feel that this limitation is controlled as again, Medicaid programs and CMS are aware of these differences, address them through the NADAC methodology (to create a representative price), and still rely on NADAC as a measure of statutorily defined actual acquisition costs (AAC).

A final limitation is that per the methodology of CMS, NADAC is limited to retail pharmacy purchases that meet CMS' definition of a Covered Outpatient Drug. In practical terms, NADAC is not established for a limited number of high-cost drugs (most frequently these products are categorized as specialty drugs). Given these products are often a source of high expenditures by health plans, this limitation can be significant in individual drug instances. However, as we already identified, the majority of claims have an established NADAC and we feel this limitation is appropriately controlled.

Limitations of Pharmacy Claims

There are hundreds of health insurance companies operating throughout the United States offering thousands of different health care coverage options. Each of these options confer differing amounts of coverage and differing levels of financial protection. Our analysis seeks to appropriately segment claims into representative buckets (i.e., PBM and line of business). However, we do not have claims from all states or US territories, and regional differences in insurance regulations may limit the degree to which

our findings can be extrapolated to the national marketplace. However, we feel this limitation is appropriately addressed given that we have the majority of states represented. The size and scope of U.S. healthcare means it is unlikely that a comprehensive data set of all plan types in all areas could be reasonably constructed.

Another limitation of our claims data is that Rx BIN, PCN, and Group numbers are imprecise numbers in claims transactions and storage. For example, a plan whose prescription benefit card indicates it may should be billed with an Rx BIN and PCN but a blank Group may still accept claims with a group number transmitted. Another example would be a Group ID that is supposed to be billed under ADV may be accepted when billed under MCAIDADV. We limited this error by relying upon the Rx BIN, PCN, and Group numbers retrieved from the Part D billing information from the CMS website to identify Part D claims, our reliance upon PBM payer documentation (i.e., NCPDP Payer Sheets), and our industry experience. As discussed, there are cases where transmitted information may be accepted by a payer for payment despite the payments fields not exactly matching. This error impacts an unknowable number of claims; however, given that the pharmacy received a successful transaction with the PBM, we believe that the risk is appropriately controlled with our methods and therefore this limitation should not impact the overall results of our analyses.

The final limitation we will discuss is our definition of brand and generic claims. These terms are largely terms of convenience with no universally agreed upon definition or standard. The system of drug approval within the United States is predicated off applications submitted to the FDA for review, the associated exclusivity conferred for certain approved application types, and patent protections. None of these are federally defined as brand or generic. In general, when brand drugs are discussed, they are discussed in relation to New Drug or Biologic Application types, with exclusivity protections that defend them from competition alongside patents that protect their intellectual property. In contrast, generics are generally discussed in regard to substitutable products that are used in place of brands. These are products approved for use via the abbreviated new drug application process (which may or may not have limited exclusivity conferred upon them). Our approach to assigning brand and generic seeks to match this general understanding; however, may not align with the contracts that ultimately govern the claim we are studying. There are potential meaningful differences in our analysis if select claims are inappropriately assigned as brand or generic. However, we do not have an available means to test what other brand and generic designations should be considered, as PBMs do not provide their brand/generic structure in the public domain.

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