An Examination of Pharmaceutical Supply Chain Intermediary Margins in the U.S. Retail Channel

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KEY POINTS

- As intermediaries in the pharmaceutical supply chain seek to maximize profits, their interactions can lead to higher drug costs for patients.
- According to our estimates, PBMs[1] had the highest profit margins[2] among intermediaries in 2022, at $60.6 billion (31.2 percent). The model suggests that these margins increased from 2020 to 2022 across all drug types.
- In 2022, wholesaler margins were $23.4 billion (6.3 percent), and pharmacy margins were $12.2 billion (3.2 percent).
- Brand drugs yield higher margins for PBMs and wholesalers in dollar value compared to generic drugs ($30.7 billion and $14.1 billion for brand drugs, compared with $29.9 billion and $9.3 billion for generic drugs in 2022, respectively).
- Brand drugs yield lower margins for pharmacies in dollar value compared to generic drugs (-$0.5 billion for brand drugs, compared with $12.7 billion for generic drugs in 2022).
- PBMs seem to be more effective than other intermediaries at securing high margins. Understanding how these margins accrue can help inform policy discussions on lowering prescription drug spending in the United States.

BACKGROUND

Prescription drug spending in the United States was 18 percent of total national healthcare spending and totaled $603 billion in 2021.[3] The prices of 1,216 drugs rose at rates higher than inflation from 2021 to

[1] PBMs are third-party companies that manage prescription drug benefits for insurers.

[2] Margins are the portion of revenue retained from sales after accounting for acquisition costs.

[3] Parasrampuria, S. & Murphy, S., 2022. *Trends in Prescription Drug Spending, 2016-2021,* Washington, DC: Office of the Assistant Secretary for Planning and Evaluation, US Department of Health and Human Services.

2022, and 26 percent of Americans say they have trouble affording their drugs.[4,5] As prescription costs rise and drugs become less affordable, policies that reduce drug costs become more critical. However, to create effective policies, it is important to understand the mechanisms within the supply chain that raise drug costs without adding value for patients. Understanding these mechanisms is challenging, because the interactions between intermediaries are based on confidential contract terms and negotiations are not transparent.

This analysis examined profit margins within the prescription drug supply chain and the strategies that intermediaries—wholesalers, pharmacies, and PBMs—use to retain portions of expenditures and generate profits.[6] Results show that interactions between intermediaries generate substantial margins, particularly for PBMs. PBMs retain some rebates that they negotiate from manufacturers (rebates that could be passed on entirely to insurers or customers).[7,8,9,10,11] There are currently no regulatory agencies regulating PBMs; however, several states have enacted laws requiring PBMs to modify their practices, and Congress has proposed bills regulating the function of PBMs within the retail drug supply chain (e.g., the Pharmacy Benefit Manager Transparency Act of 2023). Understanding how interactions in the supply chain can lead to high margins for PBMs and other intermediaries can help policymakers create policies that reduce prices, which can facilitate making those drugs more affordable for Americans.

METHODS

This analysis used drug-level data to estimate margins for wholesalers, retail pharmacies, and PBMs from Q1 2020 to Q4 2022. Sources included public data from National Average Drug Acquisition Cost (NADAC), State Drug Utilization Data (SDUD), Federal Supply Service Schedule Pharmaceutical Pricing (FSS), and the Affordable Care Act Federal Upper Limit (FUL), as well as proprietary datasets including IQVIA National Sales Perspective (NSP), IQVIA PayerTrak, and SSR Health. The study also used PBM Annual

[4] Bosworth, A. et al., 2022. *Price Increases for Prescription Drugs, 2016–2022,* Washington, DC: Office of the Assistant Secretary for Planning and Evaluation, Department of Health and Human Services.

[5] Kirzinger, A. et al., 2023. *Public Opinion on Prescription Drugs and Their Prices.* [Online]
Available at: https://www.kff.org/health-costs/poll-finding/public-opinion-on-prescription-drugs-and-their-prices/

[6] Group purchasing organizations (GPOs) are another important intermediary in the pharmaceutical supply chains. However, GPOs operate primarily to negotiate contracts for generic drugs for inpatient use, and are thus not included in this study.

[7] Meador, M., 2011. Squeezing the Middleman: Ending Underhanded Dealing in the Pharmacy Benefit Management Industry Through Regulation. *Annals of Health Law,* 20(1), pp. 77-112.

[8] Feldman, R., 2020. Perverse Incentives: Why Everyone Prefers High Drug Prices -- Except for Those Who Pay the Bills. *Harvard Journal on Legislation,* 30(30).

[9] Kakani, P., Chernew, M. & Chandra, A., 2020. Rebates in the Pharmaceutical Industry: Evidence from Medicines Sold in Retail Pharmacies in the U.S.. *NBER Working Paper Series,* March, Volume Working Paper 26846, pp. 1-36.

[10] Trish, E., Van Nuys, K. & Popovian, R., 2022. *U.S. Consumers Overpay for Generic Drugs,* Los Angeles, CA: Schaeffer Center for Health Policy and Economics.

[11] Myshko, D., 2023. *Analysis: PBMs Block Access to Lantus Biosimilars.* [Online]
Available at: https://www.formularywatch.com/view/analysis-pbms-block-access-to-lantus-biosimilars
[Accessed 2 August 2023].

Reports published by the Iowa Insurance Division,[12] and a 2019 Government Accountability Office report on PBMs and efforts to manage drug expenditures and utilization.[13]

We calculated profit margins for PBMs, wholesalers, and pharmacies. For wholesalers and pharmacies, we calculated margin dollars as the difference between the net sales price and the net acquisition cost. For PBMs, we calculated the dollar margin as this difference plus any retained manufacturer direct and indirect remuneration (DIR), such as manufacturer rebates.

The study targeted a population of 24,395 prescription retail drugs and identified a final sample within that population that had at least 80 percent sales in retail sales and pricing and reimbursement data available at every level of the supply chain. The study's final sample included 3,720 prescription retail drugs (355 brand and 3,365 generic). This final sample was representative of the target population (e.g., proportion of brands to generics, small molecules to biologics, and drugs treating chronic conditions to drugs treating acute conditions). For each drug in the final sample, we modeled the flows of payment through the pharmaceutical supply chain (Figure A1) using multiple publicly available and proprietary data sources (Table A1). Reimbursements from third-party payers (i.e., insurers) and copays provide the initial financial input into the flow. As these expenditures pass through the supply chain, each intermediary takes a portion to cover costs and generate profit, using the rest to reimburse the next party in the chain. We determined how much of these expenditures each intermediary retained for both brand-name and generic drugs, and calculated margins for each intermediary.

We compared intermediaries' margins based on their weighted total margins in dollars across all drug sales, weighted aggregate margin percentage across all drug sales, weighted mean margins per package, and retained shares of total expenditures.

RESULTS

Based on our model, PBMs had the highest profit margins among pharmaceutical supply chain intermediaries in 2022, both by percentage and dollar amount (Figure 1). Across all retail drugs in 2022, PBM margins were $60.6 billion (31.2 percent), wholesaler margins were $23.4 billion (6.3 percent), and pharmacy margins were $12.2 billion (3.2 percent). The model estimates indicate that PBM margins increased by $18.5 billion from 2020 through 2022 across all retail drug sales.

Across both brands and generics, our model estimates that PBMs generate higher margins than wholesalers, who in turn generate higher margins than pharmacies. The one exception is for brand drugs in 2020, on which pharmacies made slightly higher margins than wholesalers. According to our model, PBM margins steadily rose year over year, as did wholesaler margins on generic drugs. Wholesaler margins on brand drugs and pharmacy margins on generic drugs remained roughly consistent from one year to the next, while pharmacy margins on brand drugs declined over time. Generic drugs had higher margin percentages for all intermediaries (40.2 percent for wholesalers, 35.6 percent for pharmacies,

[12] Iowa Insurance Division, 2020-2023. *PBM Annual Reports,* s.l.: s.n.

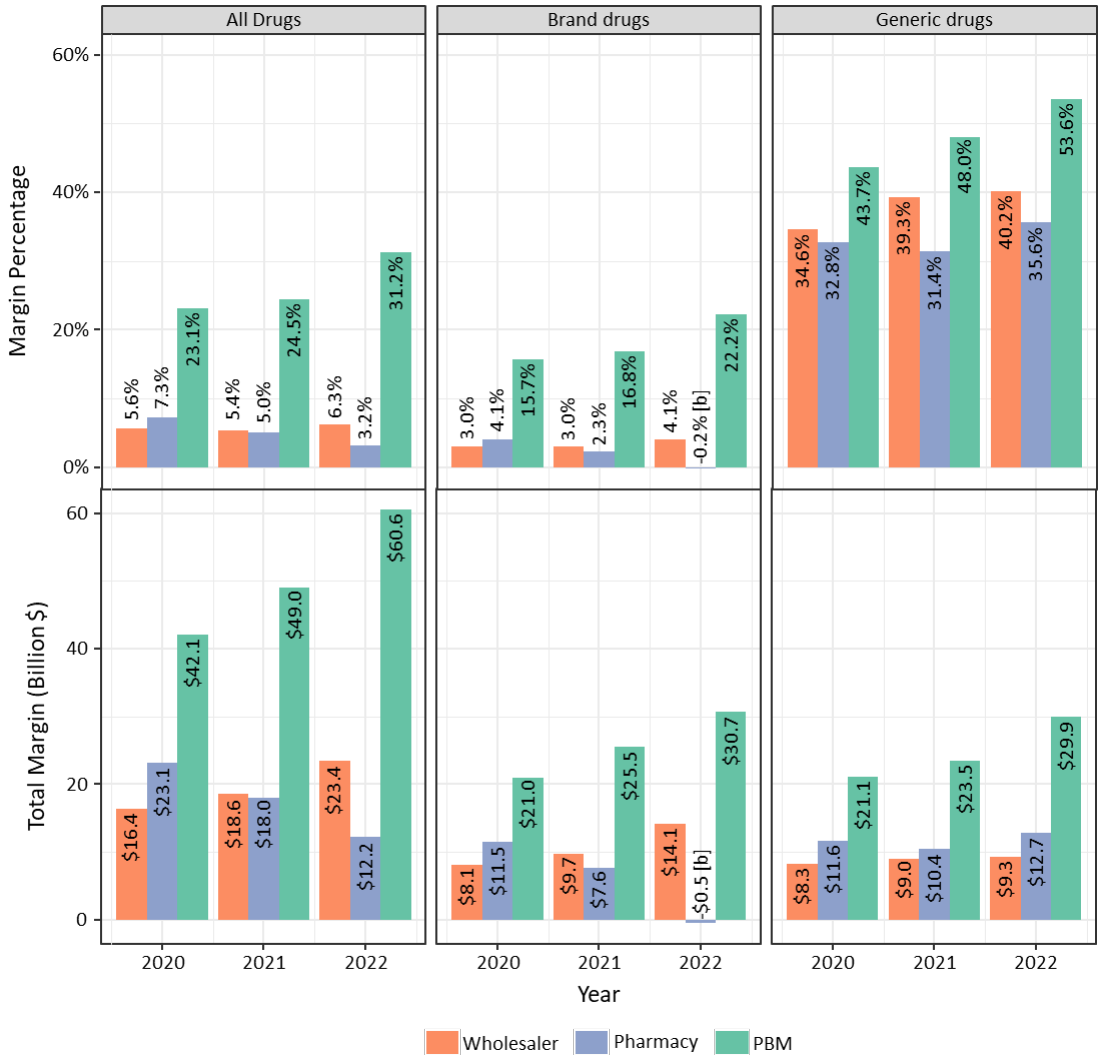
[13] United States Government Accountability Office, 2019. *Use of Pharmacy Benefit Managers and Efforts to Manage Drug Expenditures and Utilization,* s.l.: s.n.

and 53.6 percent for PBMs in 2022). However, PBMs and wholesalers earned more margin dollars from brand drugs because brand drugs are much more expensive.

Based on the study model, PBMs also captured an increasing share of total expenditures from 2020 through 2022 for generic and brand drugs (Figure 2). Manufacturers' share of expenditures was roughly constant for brands but decreased for generics, while pharmacies had a roughly constant share for generics but a decreasing share for brands. Wholesalers' share of brand drug expenditures increased in 2022 but was roughly constant over the study period for brands and generics.

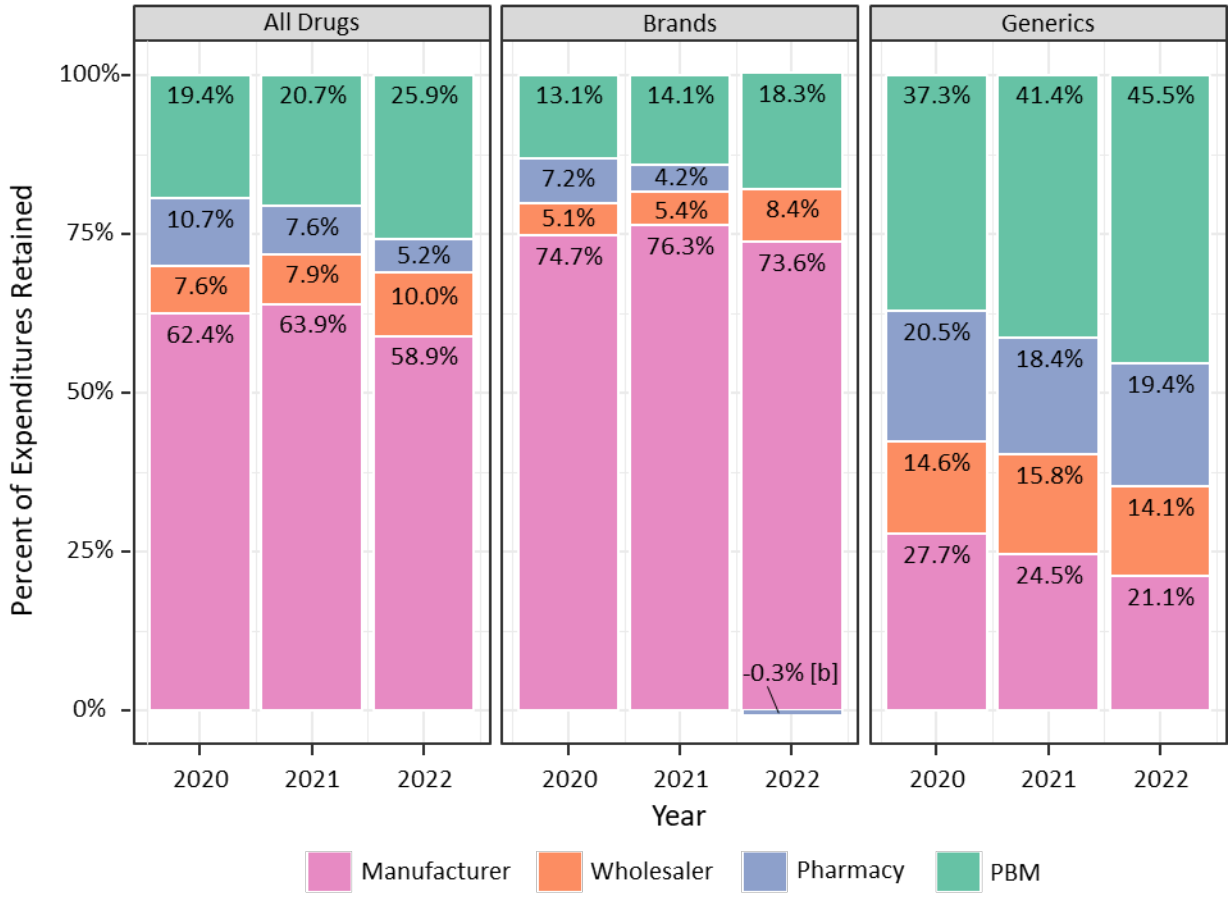
Based on our study results, total expenditures are more evenly distributed amongst intermediaries for generic drugs than they are for brand drugs. For brand drugs overall, manufacturers retain the largest share of total expenditures, and PBMs have the largest share of total expenditures compared to all other intermediaries. In 2022, manufacturers retained almost three-quarters of expenditures on brand drugs.

Figure 1. Estimated Margin Percentage and Total Dollars by Intermediary, 2020–2022 [a]



[a] Figure presents weighted population estimates. Margin percentage is calculated as weighted total margin across all drugs divided by weighted total net sales.
[b] Pharmacies are estimated to have margins of -0.2% (-$0.5 billion) on brand drugs in 2022, which corresponds to a loss. The 95% confidence interval for this value, however, extends into the positive range.

Figure 2. Estimated Retained Share of Expenditures, by Intermediary, 2020–2022 [a]



[a] Figure presents weighted population estimates. Values may not sum to 100% due to rounding.
[b] Pharmacies are estimated to have retained -0.3% of total brand drug expenditures in 2022, which corresponds to a loss. The 95% confidence interval for this value, however, extends into the positive range.

DISCUSSION AND CONCLUSION

This study used multiple data sources to estimate the margins received by wholesalers, PBMs, and pharmacies in the pharmaceutical supply chain. By comparing each intermediary's margins to their actual net sales price, we estimate that total margins for all retail drugs were 6.3 percent for wholesalers, 3.2 percent for pharmacies, and 31.2 percent for PBMs in 2022. Our estimates suggest that PBM margins have been increasing at a faster pace than other intermediaries, potentially at the expense of pharmacy margins, which steadily decreased from 2020 to 2022.

Our results suggest that PBMs' margins steadily increased from 2020 through 2022 across all types of retail drugs. These findings are broadly in line with earlier studies on flow and distribution of money through the pharmaceutical supply chain.[14,15] Multiple factors may have contributed to the increase in PBM margins:

- **Advantageous market structure.** The largest three PBMs controlled 79 percent of the U.S. healthcare market in 2022,[16] potentially allowing them to negotiate larger manufacturer rebates and DIR fees.
- **Vertical integration.** PBMs have become vertically integrated with insurers and pharmacies, which allows them to obtain favorable contract terms and gain competitive advantage over other intermediaries while avoiding costly disputes.[17]
- **Consolidation.** Because PBMs are consolidated across the health insurance market, they can comply with state restrictions on spread pricing[18] while recouping profits elsewhere.
- **Retained DIR.** According to our analysis, PBMs retain 12.4 percent of total DIR,[19] and DIR rose over the study period. DIR fees include both manufacturer rebates and fees paid by pharmacies. In our model, the estimated margins are sensitive to DIR, which are based on limited data. Future research could examine the role of DIR in margins of PBMs and pharmacies.

Determining the margin percentages earned by intermediaries in the retail pharmaceutical supply chain and evaluating how these margins change by entity and by drug type provides valuable information on which factors might contribute to high prices of drugs sold through retail pharmacies. These estimates could help inform policy discussions on lowering overall prescription drug spending in the United States.

[14] Sood, N., Mulligan, K. & Zhong, K., 2021. Do Companies in the Pharmaceutical Supply Chain Earn Excess Returns?. *International Journal of Health Economics and Management,* 21(1), pp. 99-114. doi: 10.1007/s10754-020-09291-1.

[15] Van Nuys, K., Ribero, R., Ryan, M. & Sood, N., 2021. Estimation of the Share of Net Expenditures on Insulin Captured by US Manufacturers, Wholesalers, Pharmacy Benefit Managers, Pharmacies, and Health Plans from 2014 to 2018. *JAMA Health Forum,* 2(11), pp. e213409-e213409. doi: 10.1001/jamahealthforum.2021.3409.

[16] Fein, A., 2023. *The Top Pharmacy Benefit Managers of 2022: Market Share and Trends for the Biggest Companies.* [Online] Available at: https://www.drugchannels.net/2023/05/the-top-pharmacy-benefit-managers-of.html

[17] In 2022, several health insurance providers merged with PBMs that operate specialty pharmacies. These included the purchase of Aetna by CVS Health, the acquisition of Express Scripts by Cigna, the establishment of IngenioRx by Anthem, and alliances formed between Express Scripts and Prime Therapeutics (Fein, A., 2022. *Mapping the Vertical Integration of Insurers, PBMs, Specialty Pharmacies, and Providers: A 2022 Update.* [Online] Available at: https://www.drugchannels.net/2022/10/mapping-vertical-integration-of.html [Accessed 6 March 2024].)

[18] Spread pricing refers to a PBM pricing model in which the PBM charges the third-party payer more than it reimburses the pharmacy and collects the difference. Recent state laws and Senate bills have sought to limit or ban spread pricing (e.g., Senate bill 127, the Pharmacy Benefit Manager Transparency Act of 2023). Pass-through contracts are meant to reduce spread pricing by requiring the third-party payer to pay the PBM the same price as the PBM reimburses the pharmacy. However, because of the market consolidation of PBMs, PBMs can choose to pay pharmacies more for pass-through claims, which allows them to pay less on traditional contracts and increase price spread elsewhere while still collecting administrative fees on pass-through contracts.

[19] Iowa Insurance Division, 2020-2023. *PBM Annual Reports,* s.l.: s.n.

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APPENDIX

Modeled Payment Flows for Drugs Sold Through Retail Pharmacies

For each sampled prescription retail drug, we modeled the flows of payment through the pharmaceutical supply chain on a per-prescription basis (Figure A1). Table A1 shows the data sources and calculation methods for each payment flow. The stylized model begins with the main financial input into the system, the reimbursement from the payer. This initial payment passes through the supply chain, and at each stage, the intermediary keeps a portion and uses the rest to reimburse the next stakeholder. We assume the sum of the dollar amounts retained by the intermediaries and manufacturers equals the total inputs into the system, forming a closed system among the entities shown in Figure A1. There are also upward payment flows in the diagram, which represent rebates that manufacturers pay to PBMs and pharmacy DIR.

The left part of Figure A1 presents our stylized model for the payment flows of a brand drug prescription. When a drug is dispensed, the third-party payer pays the PBM (flow 1). The PBM may retain an administrative fee on a per-prescription basis (flow 2) and passes the remainder to the pharmacy (flow 3) to cover ingredient costs and dispensing fees. The pharmacy also receives a copay from the beneficiary (flow 4). Pharmacies may pay one or more types of DIR fees to PBMs (flow 5). The PBM may retain a portion of this DIR fee (flow 6) and pass the rest on to the third-party payer (flow 7), though our calculations assume that the PBM retains all pharmacy DIR. The pharmacy purchases the drug from the wholesaler at a net price that accounts for rebates and discounts (flow 8). The wholesaler purchases the drug from the manufacturer at a discounted rate off the wholesale acquisition cost (WAC, flow 9). The manufacturer often passes payment on to the PBM as a rebate and/or administrative fees (flow 10). The PBM retains a portion of this rebate (flow 11) and passes the rest on to the third-party payer (flow 12).

We modeled the pharmacy reimbursement (flow 3) as the difference between the third-party payer reimbursement and the PBM's retained fee: (flow 3) = (flow 2) – (flow 1). The copay (flow 4) is estimated from IQVIA's PayerTrak dataset as a weighted average across all states and payers. In cases where copay information was not available in IQVIA PayerTrak or could not be matched to a specific drug (i.e., 11-digit NDC), we used an average copay of $56 for brand drugs and $6 for generic drugs, based on a 2022 report.[20]

We used NADAC to model the net price between the pharmacy and wholesaler (flow 8). CMS's Retail Price Survey only covers retail pharmacies and accounts for most rebates and discounts that the wholesaler provides to the pharmacy. We modeled the wholesaler's net acquisition cost (flow 9) by taking 91 percent of the WAC published in IQVIA NSP, which is equivalent to one minus the 9 percent discount rate estimated by researchers at the Urban Institute.[21] We estimated manufacturer rebates (flow 10) from SSR Health data on mean gross-to-net discounts. We accounted for statutory rebates paid to the Medicaid Drug Rebate program, which are separate from the rebates manufacturers collect, and generate no revenue for the PBM. We did not estimate the administrative fees that manufacturers pay

[20] Association for Accessible Medicines, 2022. *The U.S. Generic & Biosimilar Medicines Savings Report,* s.l.: s.n.

[21] Epstein, M. et al., 2023. *A Methodology for Estimating Medicaid and Non-Medicaid Net Prices Using Top Brand-Name Drugs, 2015–2019,* Washington, DC: Urban Institute.

PBMs. We assumed the PBM retains 0.4 percent of the manufacturer rebates (flow 11),[22] and that the PBM passes the remaining 99.6 percent of the rebate on to the third-party payer (flow 12).

[22] United States Government Accountability Office, 2019. *Use of Pharmacy Benefit Managers and Efforts to Manage Drug Expenditures and Utilization,* s.l.: s.n.

Figure A1. Payment Flows per Prescription for a Drug Sold Through the Retail Channel

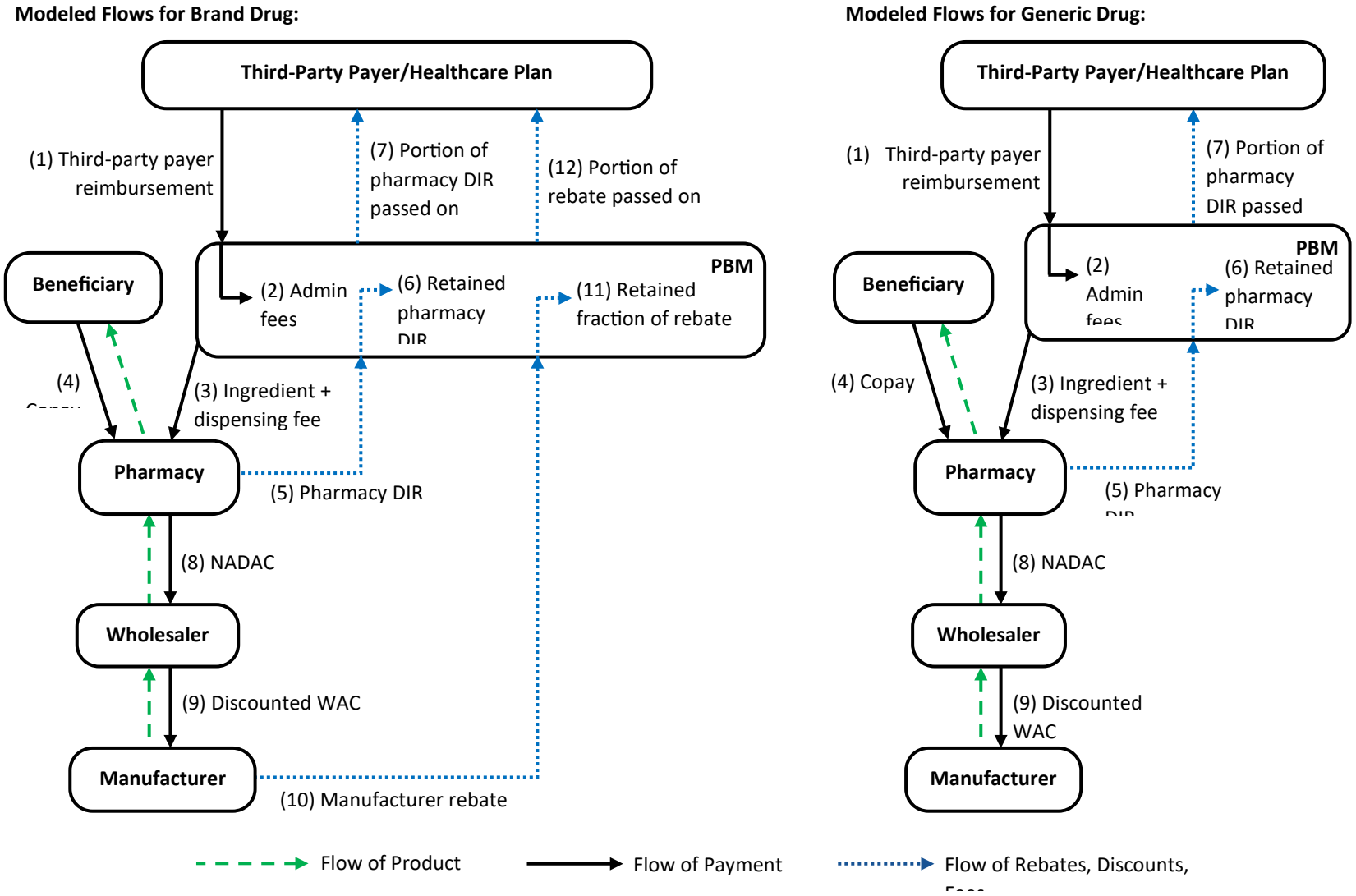

Table A1. Data Sources for Modeling Payment Flows

Payment Flow	Data Source(s) and Calculation Method	
	Brand Drugs	Generic Drugs
(1) Third-party payer reimbursement	Estimated from CMS State Drug Utilization Data (2020-2022)	Estimated from CMS State Drug Utilization Data (2020-2022)
(2) Administrative fees	Assumed to be $2 per package sold, based on market research and a 0.8% total price spread on brands reported by the Ohio Auditor of State[23]	Not estimated separately because this is incorporated into the calculation of (3) for generics
(3) Ingredient + dispensing fee	(1) – (2)	Estimated as the CMS FUL price
(4) Copay	Calculated from IQVIA PayerTrak (2020-2022), or average copay of $56 if data not available[24]	Calculated from IQVIA PayerTrak (2020-2022), or average copay of $6 if data not available[25]
(5) Pharmacy DIR	Estimated as 13.7% of (10) [a]	Assumed to equal 8% of the difference between the pharmacy's sales price and purchase price
(6) Retained pharmacy DIR	Assumed to be 100% of collected pharmacy DIR	Assumed to be 100% of collected pharmacy DIR
(7) Portion of pharmacy DIR passed on	(5) – (6)	(5) – (6)
(8) NADAC	Calculated from CMS NADAC survey (2020-2022)	Calculated from CMS NADAC survey (2020-2022)
(9) Discounted WAC	Assumed to be 9% of WAC listed in IQVIA NSP[26]	Calculated from the WAC in IQVIA NSP (2020-2022), with a discount based on Big Four prices (2020-2022)
(10) Manufacturer rebate	Calculated from SSR Health (2020-2022) and WAC in IQVIA NSP (2020-2022) [b]	Assumed to be $0 for generic drugs
(11) Retained fraction of rebate	Assumed to be 0.4% based on GAO report (2019)	Assumed to be $0 for generic drugs
(12) Portion of rebate passed on to third-party payer	(10) – (11)	(10) – (11)

[a] We assumed the PBM retains 12.4% of the total collected DIR based on Iowa PBM Annual Reports (2021-2022). We modeled the total collected DIR as (manufacturer rebate) + (pharmacy DIR), and we modeled the retained amount as (0.4%)(manufacturer rebate) + (100%)(pharmacy DIR). Therefore: (12.4%)(manufacturer rebate + pharmacy DIR) = (0.4%)(manufacturer rebate) + (100%)(pharmacy DIR), which simplifies to (pharmacy DIR) = (13.7%)(manufacturer rebate).
[b] We have not modeled all price concessions made by the manufacturer, including, for example, 340B discounted prices and copay assistance programs. This likely leads to an overestimate of the rebate and, consequently, pharmacy DIR.

[23] Yost, D., 2018. Ohio's Medicaid Managed Care Pharmacy Services, Auditor of State Report. [Online] Available at: https://audits.ohioauditor.gov/Reports/AuditReports/2018/Medicaid_Pharmacy_Services_2018_Franklin.pdf

[24] Association for Accessible Medicines, 2022. *The U.S. Generic & Biosimilar Medicines Savings Report,* s.l.: s.n.

[25] *Ibid.*

[26] United States Government Accountability Office, 2019. *Use of Pharmacy Benefit Managers and Efforts to Manage Drug Expenditures and Utilization,* s.l.: s.n.