

## **The Formulary Game**

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### **Abstract**

This paper presents a descriptive model that highlights the essence of what pharmacy benefit managers (PBMs) do in managing certain formulary choices made by their clients. These choices are affected by market share rebates offered by drug manufacturers. We have found that a model based on simple game theory provides key insights into the behavior of PBMs. Formalizing exactly how PBMs behave may be useful in examining complex legal and accounting questions that turn on characterizations of behavior.

## **Introduction**

Almost all private health care insurance plans today rely on third-party contractors called pharmacy benefit managers (PBMs) to manage the prescription (Rx) drug benefits portion of the plan. Arguments for and against extending Medicare to cover outpatient Rx drugs costs sooner or later will come around to PBMs. What do they do? Do they act as fiduciaries when they manage the drug portion of health care benefit plans? Or are they service providers with no discretionary decision-making power? To what extent are they agents working on behalf of their clients? To what extent are they principals acting in own self-interest?

This paper presents a descriptive model that highlights the essence of what PBMs do in managing certain formulary choices made by their clients. These choices are affected by market share rebates (MSRs) offered by drug manufacturers. In addition, we present a plausible explanation of how drug manufacturers derive MSR schedules and the situations they choose to offer such rebates. We have found that a model based on simple game theory provides key insights into PBM behavior. Game theory is concerned with the actions of players who are conscious that their actions affect each other's payoff. The players in this case are health care plan sponsors. There are two elements that set up the game: market share rebates (MSRs) and the formulary. Market share rebates are the payoffs offered by drug manufacturers and are the source of the interdependencies. The formulary represents the choice set available to plan sponsors.

By framing the description as an abstract model, we pinpoint exactly what PBMs do to make MSRs work. The model demonstrates that PBMs and MSRs are inextricably related. We will show that PBMs behave as good dual agents for both plan sponsors and drug manufacturers when they translate MSR schedules into marginal costs schedules. Indeed, we think that they explain to clients the pitfalls of making uncoordinated formulary choices based on average MSR schedules put forth by drug manufacturers. Without PBMs to manage formulary choices, plan sponsors and drug manufacturers would be facing a game-like "prisoner's dilemma" situation

where choices based on individual self-interest lead to poor payoffs for all. Without PBMs, MSRs would not work.

Formalizing exactly how PBMs behave can be useful in examining complex legal and accounting questions that turn on characterizations of behavior. For example, the applicability of the Employee Retirement Income Security Act (ERISA) turns on whether a company is characterized as a fiduciary or as a service provider. It is behavior that seems to distinguish a fiduciary from a service provider. Fiduciaries make discretionary decisions in the administration of a health care benefits plan. Service providers do not. PBMs claim that they are service providers because all discretionary decisions in the administration of the formulary are left to the plan sponsor. Our model of PBM behavior may be useful in examining this question.

Another question has to do with how PBMs account for rebates from drug manufacturers. PBMs' auditors have made a determination that allows them to account for rebates on a "net basis" versus a "gross basis". This determination is very advantageous to PBMs because it allows them to mask their rebate-retention rate—the share of gross rebates received from drug manufacturers that they retain. Disclosure would offer clients a benchmark that could be used to negotiate more favorable contracts with PBMs. This accounting issue turns on whether a PBM is classified as principal or an agent. Accountants have developed a hodge-podge list of behavioral, contractual, and financial characteristics. But there is a common thread running through all of these. Principals are risk takers and act independently. Agents do not take risks and only act in the best interest of their clients. Our model may be useful in determining whether PBMs act as principals or as agents when they manage certain formulary choices for their clients.

We wish to be clear at the outset that our model deals with only part of the formulary choice process. It is not the most important part in terms of potential cost-savings to plan sponsors. The most important aspect involves potential substitution of generic drugs for off-patented brand drugs. Our model deals only with the potential substitution of patented drugs for other

therapeutically equivalent patented drugs of similar costs. The cost-savings are strictly in terms of MSRs received. While MSRs come into play in only a relatively small number of therapeutic classes, the competition is usually between “blockbuster” drugs manufactured by some of the biggest names in pharmaceuticals. There is another important aspect to formulary choice that seems behavioral that we do not deal with here. It is the rebate-retention rate --- the share of gross rebates received by PBMs that is retained and not passed on to plan sponsors. This is the reward to PBMs for their management efforts. In our opinion, the specific rate is a reward for certain behavior, but it is not behavior itself.

### **Market Share Rebates**

The pay-off in the formulary game is MSRs. Rebates from drug manufacturers to PBMs generally fall into two categories: (1) volume or access fees, and (2) market share rebates. Volume fees are paid to PBMs and shared with plan sponsors if an individual drug achieves a non-exclusive preferential status in a formulary. These fees are a fixed percentage of dollar volume. It is MSRs alone that create choice interdependencies and a game-like situation. These rebates are structured as a tiered system of percentages that are a function of the swing above a baseline market share a PBM delivers. Since MSRs are based on the aggregate share delivered by a PBM, they create a situation where formulary choices of individual plan sponsors affect the payoff of other plan sponsors who have contracted with the same PBM.

Drug manufacturers are certainly aware of this. They intended it that way. They know that individual plan sponsors do not have the power to move markets. Only PBMs have that power. Seventy-one percent of all outpatient prescriptions are funneled through formularies managed by PBMs. The top six PBMs control 57% of all prescriptions covered by third party payers.<sup>1</sup> No single plan sponsor controls more than 5%. Drug manufacturers are savvy enough to realize that individual plan sponsors do not have the size to “move markets” like the big PBMs. They know that negotiating MSRs directly with plan sponsors would result in a lot of money paid for closed but mutually exclusive formulary choices with no net impact on aggregate market shares. The

goal of drug manufacturers is not merely closed formularies, but closely aligned formularies. And it is only the big PBMs who hold the promise of delivering closely aligned formularies.

There is not much publicly available information about MSRs. There doesn't seem to be any "insider" reports on how drug companies construct rebate schedules nor any sense of what factors affect the numbers. Rather than introducing a fully constructed rebate schedule into our model, important insights can be gained by presenting a plausible explanation of how a manufacturer might build a MSR schedule. The explanation reveals how different competitive situations and different cost structures of a drug manufacturer can cause rebate schedules to vary.

We think that a manufacturer starts out by asking what is it willing to pay for, say a 1%, increase in sales for a particular drug it manufactures. The most a manufacturer is willing to pay is the "contribution margin" of revenue minus variable costs of sale minus some target pre-tax earning rate. Using figures from the latest quarterly financial statement of one of the large patented drug manufacturers, Pfizer, we can translate this formula into specific numbers.<sup>2</sup> Pfizer reported the following rates and margins: cost of good sold (COG) of 15% (with a complementary gross profit margin of 85%); sales, general, and administrative (SG&A) of 49%; and earning before interest and taxes (EBIT) of 36%. Assuming COG is the sum of a variable cost of sale of 5% and a fixed cost production rate of 15%, then the contribution margin would be 95% and the willingness-to-pay, or contribution margin less EBIT, would be 95% minus 36% = 59%. The rebate that this manufacturer would be willing to pay for 1% increase in sales would be 1% times (95% minus 36%) = .59%.

What remains to be done is to translate market share swings delivered by a PBM into rates of increase in the manufacturer's sales. This requires the manufacturer to set some baseline distribution of sales between the manufacturer's drug and its competitors. Assume for example that the baseline share for a particular PBM is set at 50 / 50. That 50-share represents 20% of

the total sales of the manufacturer's drug. Managing a 10 point swing to 60 / 40 would result in a 2% increase in the manufacturer's sales and would be rewarded with a rebate equal to  $2\% * .59\%$  of the manufacturers sales. This is equivalent to  $10\% * .59\% = 5.9\%$  of the sales controlled by the PBM. In general, the PBM rebate rate as a function of swing is  $= (\text{swing}) * (\text{contribution margin} - \text{EBIT})$ . Thus a 10-point swing is rewarded by a 5.9% rebate; a 20-point swing is rewarded by an 11.8% rebate; a 30-point swing is rewarded by a 17.7% rebate; etc.

Brand name drug manufacturers offer MSRs only when their product faces competitive alternatives. This condition is present in a small number of therapeutic classes. When the competition is present, it is between "blockbuster" drugs whose sales are significant contributors to the profitability of the biggest names in pharmaceuticals. Drugs can be classified as facing one of three possible competitive situations:

- (1) A single patented drug with no therapeutic equivalents (no substitution);
- (2) The set of patented and off-patented drugs facing competition from other drugs that are therapeutic equivalents (close substitution);
- (3) The set of generic drugs (perfect substitutes).

A Congressional Budget Office study has estimated the distribution of retail pharmacy sales in 1994 by competitive situation.<sup>3</sup> The study found that 55.5% of all retail pharmacy sales represented single source patented drugs with no therapeutic equivalents; 27.2% represented therapeutic equivalents with close substitutes, and the remaining 17.3% represented generics.

Brand drug manufacturers pay volume rebates for all drugs in class (1) and class (2). This means that volume rebates are paid on 82.7% of the retail Rx drugs sales covered by health care plans. There is no reason for MSRs to be paid in case (1) because there is no competition. In case (3), generic drug manufactures historically have negotiated rebates with chain drugstores and buyer co-ops because substitutability comes into play in purchasing choices at the wholesale level and not in choosing the design of a formulary. MSRs are paid only for patented drugs in case (2). Assuming a 50 / 50 division between patented and off-patented drugs in case (2), this means that MSR are estimated to be paid on only 13.6% of Rx drug spending covered by third-party plans.

## **Formulary Choice**

The formulary is a look-up table that PBMs have added to point-of-sale claims processing systems. It checks a prescription request against a list of therapeutic equivalents preferred by the plan sponsor. The formulary can flag a pharmacist to request that a generic drug be substituted for a higher priced off-patented brand name drug. A formulary also can flag a pharmacist to call a prescribing physician to seek approval for the substitution of one brand name drug for another in the same therapeutic class.

There is a two-step process a drug must go through before it is listed in the formulary --- an approval phase and a preferential phase. A committee of medical professionals completely independent of the PBM governs the approval phase. The board is charged with approving a list of therapeutically equivalent drugs for each class. Cost is not a factor in their choice. According to PBMs, plan sponsors supposedly are the sole discretionary decision-makers in the preferential phase. Plan sponsors decide how far to restrict a committee-approved list for each therapeutic drug class. With the technical assistance of its PBM, a plan sponsor considers the trade off between costs, including the likely rebate from the manufacturer, and the desire to offer its members breadth of choice. Generally, the more closed the formulary the less it will cost the plan sponsor because there are controls and incentives that promote the substitution of generic drugs for higher cost branded drugs and because plan sponsors receive, via PBMs, rebates from drug manufacturers that escalate with exclusivity.

The selection process for plan sponsors doesn't involve as many individual choices as one might think. Plan sponsors do not start with a blank look-up table and build their formulary line by line. PBMs do not simply present their clients with the entire set of manufacturer rebates schedules and ask them to make choices based on that information. Rather, PBMs initiate the process by offering a pre-designed formulary, sometimes known as the national formulary.<sup>4</sup> When plan sponsors meet with PBMs to discuss the design of their formulary, we can imagine that the key aid used in this process is a laptop computer loaded with proprietary software that models the

financial consequences of an individual client's formulary choices. The computer model starts with a national formulary and an assumed pattern of choice by the client base. Based on these parameters, the program projects the costs to the client including MSRs received. The client is then free to customize the national formulary by opening or closing specific therapeutic classes. The computer calculates the marginal cost or marginal benefit of individual changes. The client makes customization decisions based on cost versus breadth of choice for its members.

Calculations for all costs except MSRs are relatively simple. They are a function of the client's projected usage only. The computer model fixes all drug prices and the volume rebate rate. This is not the case with MSRs. With MSRs, a client's choice to deviate from the national formulary causes a slight swing in the market share the PBM delivers to a manufacturer. The computer model translates the lower swing into a lower average MSR percentage. Even though this change may be measured in tenths of a percentage, it still represents a cost to all clients, not just the individual client contemplating the change.

For example, each of the largest PBMs controls approximately \$300 Million to \$1 Billion worth of spending on the blockbuster drugs Zocor and Lipitor. A decision by one plan sponsor to open up its formulary to both drugs rather than standardize on one can result in 1% lower MSR rate a PBM is due to receive. In order to make individual clients "act responsibly", the computer model assigns the entire loss of \$3M to \$10M to the individual client. One can imagine the reaction of a client when it sees the laptop screen flash a \$10M loss in MSR as a consequence of opening up a therapeutic class to both drugs rather than standardizing on one.



## The Formulary Game

The following model derived from game theory formalizes the discussion presented above. It demonstrates the essential nature of interdependencies of formulary choices created by MSRs. Rather than being totally abstract, we use the names of two patented, but therapeutically equivalent, drugs that are involved in a major battle for market share. This is the intense fight between Pfizer's Lipitor and Merck's Zocor in the cholesterol-reducing therapeutic class. Their market share is 42% and 32%, respectively, of an \$18.8 Billion dollars market.<sup>5</sup> While the names are real, all numbers used in this model are illustrative but fictional.

Consider a single PBM with only two plan sponsors, A and B, each representing 50% of all prescriptions filled in the cholesterol-reducing therapeutic class. Each plan sponsor has three possible formulary choices: (1) an open formulary (Lipitor-ok, Zocor-ok); (2) a closed formulary (Lipitor-ok, Zocor-no); and a third mutually exclusive closed formulary (Lipitor-no, Zocor-ok). The resulting market share outcome matrix is presented in Table 1 below:

**Table 1: Formulary Options**

		Plan A's Formulary Options		
		Lipitor -ok, Zocor-no (Closed)	Lipitor-ok, Zocor-ok (Open)	Lipitor-no, Zocor-ok (Closed)
		Resulting Market Share (%) Delivered by PBM		
Plan B's Formulary Options				
Lipitor-ok, Zocor-no	(Closed)	100 / 0	75 / 25	50 / 50
Lipitor-ok, Zocor-ok	(Open)	75 / 25	50 / 50	25 / 75
Lipitor-no, Zocor-ok	(Closed)	50 / 50	25 / 75	0 / 100

The first important insight of this model is that individual choices of closed but mutually exclusive formularies yield results no better than choices of open formularies all around. Closed formularies do not move markets. Closely aligned formularies do.

Table 2 below introduces the MSR schedules based on the work done earlier. Both manufacturers present the same schedule based on percentage swings above the benchmark of 50% share.

**Table 2: Average Rebate Schedule**

Point Swing Above 50% Benchmark	Rebate Rate
0	0.00%
25	14.75%
50	29.50%

Based on this schedule, we derive a pay-off matrix in Table 3:

**Table 3: Payoff Matrix**

Plan A's Formulary Options		Overall Payoff - Gross %		
		Lipitor -ok, Zocor-no (Closed)	Lipitor-ok, Zocor-ok (Open)	Lipitor-no, Zocor-ok (Closed)
Plan B's Formulary Options				
Lipitor-ok, Zocor-no	(Closed)	29.50	14.75	0
Lipitor-ok, Zocor-ok	(Open)	14.75	0	14.75
Lipitor-no, Zocor-ok	(Closed)	0	14.75	29.50

What would be the best strategy for plan sponsors if they made choices in isolation based on the average rebate schedules provided by both drug manufacturers? In this case, choosing an open formulary over any of the two closed formularies would be the “dominant strategy” in that it is a player’s best choice – in terms of payoff and breadth of offering -- in response to any choice the other player might make. Choosing open formularies is equivalent to the (confess, confess) strategy in the prisoner’s dilemma game.

MSRs only work to “move markets” if PBMs exercise some discretion in managing formulary choice. They do this by initializing the process with a standardized formulary of their own choosing. In a few key therapeutic classes where there are intense battles between patented drugs, it is the PBM that chooses initially what drug is preferred. Individual plan sponsors are then free to deviate from the standard and customize, but they are subject to the marginal consequences of their act—the loss in rebates to themselves and all other clients managed by the PBMs.

The second crucial act performed by PBMs when they manage formulary choices affected by MSRs is to translate the average rebate schedules of drug manufacturers into rebate schedules projecting the marginal costs and benefits from customization. Table 4 below is a translation of the average rebate schedule presented earlier in our example.

**Table 4: Marginal Rebate Schedule**

Choice	Average Rebate Rate	Marginal Cost to Client	Marginal Cost to Rest	<b>Marginal Rebate Rate</b>
align	29.50%	0	0	<b>29.50%</b>
open	14.75%	-14.75	-14.75	<b>0.0%</b>
misalign	0.0%	-25.9	-25.9	<b>-25.9%</b>

The example indicates the severe penalty a plan sponsor can face if it deviates from the standard in a key therapeutic class. But, it is in a plan sponsor’s best interest to be made fully responsible for the consequences of customization. It is best for plan sponsors to base their formulary choices on the marginal rebate schedules of PBMs instead of average rebate schedules of drug manufacturers.

Our model highlights the essence of what PBMs do in managing formulary choices affected by MSRs. Their act of initializing formulary choice with a national formulary of their own design is an

act of a principal. It represents discretionary behavior on the part of the PBM. Once this is done, the act of translating average rebate schedules into marginal schedules is the act of a good dual agent and service provider. Market share rebates move markets not by closing formularies but by closely aligning formularies. We think that this formalization of how PBMs manage certain formulary choices may be useful in dealing with several legal and accounting issues that turn on characterizations of PBM behavior.

Notes to "The Formulary Game"

- (1) Cook A., Kornfield T., Gold M. *The Role of PBMs in Managing Drug Costs: Implications for a Medicare Drug Benefit*. Prepared for the Henry J. Kaiser Family Foundation, Inc 2000.
- (2) United State Securities and Exchange Commission. *Form 10-Q*. Pfizer for Quarter Ending September 29, 2002. Available at: <http://www.edgar-online.com>
- (3) United States Congressional Budget Office. *How Increased Competition from Generic Drugs has Affected Prices and Returns in the Pharmaceutical Industry*; 1998.
- (4) Express Scripts. *White Paper: Formulary Management at Express Scripts*. Available at: [http://www.express-scripts.com/other/company/formulary\\_development\\_whitepaper.pdf](http://www.express-scripts.com/other/company/formulary_development_whitepaper.pdf)
- (5) Simon J. The \$10 Billion Pill. *Fortune* 2003; 147(1): 58-68.