

5. FORMULARY ANALYSIS MODEL

Background

As the final part of this project, the NORC-Georgetown team developed a model that simulates beneficiaries' responses to plan decisions about formulary placement and cost sharing. This model is based on a theoretical understanding of how beneficiaries are likely to respond to price incentives, as well as expert clinical opinion about the likelihood that beneficiaries will change drugs in response to price.

The behavior of individual patients in reaction to a plan's formulary can vary, reflecting a mix of factors such as wealth, knowledge about the underlying health condition, knowledge about (and experience with) alternatives, advertising, the price of alternatives, and comorbid conditions and therapies. Furthermore, prescriptions are written by physicians who usually face no financial incentive to follow a plan's formulary; most are not aware of the prices their patients face for different drugs. Prescribing physicians are also influenced by a variety of factors, including their previous clinical experience, their reading of the research, experiences with formularies of multiple payers, and detailing by manufacturer representatives. The physician's lack of involvement with the formulary can dampen a patient's ability or willingness to be price-sensitive, because many patients do not want to second-guess their doctor's prescriptions.

Overall, however, the use of a closed formulary or an open formulary with financial incentives (such as a three-tier copay) or administrative incentives (such as prior authorization or therapeutic substitution) can change spending patterns in three ways:

Reduced utilization. Some consumers use fewer drugs because of higher costs or administrative barriers. The extent to which the utilization of prescription drugs drops when copayments increase or other barriers are imposed is referred to as the *elasticity of demand*.

Changes in the mix of drugs. Some consumers switch from drugs in a non-preferred category to preferred or generic drugs. This also reduces spending for the health plan and the consumer. The extent to which consumers will switch between similar drugs because of a difference in price or other barriers is known as the *cross-elasticity of demand*.

Higher enrollee copayments. Some consumers absorb the higher copayments when the drugs they use are placed in a higher tier. This shifts costs from the health plan to the consumer. Consumers who do not change their utilization patterns despite a change in price or other barriers are considered to have *inelastic* demand.

In a study of a PPO population by researchers at Express Scripts, the addition of a 3-tier copay (\$8/15/25) caused health plan costs to drop 17.1 percent, with 5.3 percent attributed to reduced utilization, 1.9 percent attributed to substitution of lower-priced drugs, and 9.9 percent attributed to enrollees paying higher copayments to continue taking the same drugs.¹

¹ Motheral, Brenda, and Kathleen Fairman, "Effect of Three-Tier Prescription Copays on Pharmaceutical and Other Medical Utilization," *Medical Care* 39(12): 1293-1304, December 2001.

Kamal-Bahl and Briesacher studied anithypertensive use in a variety of health plans and found that enrollees in two-tier plans with the largest difference (\$10) between the prices of generics and brand name drugs were least likely to use angiotensin II receptor blockers (ARBs), which had no generic alternatives at the time of the study. Their study suggests shifting between drugs caused a decrease in total spending, rather than a simple shift in costs from the plan to the consumer. In contrast, enrollees in three-tier plans were not less likely to use ARBs, but the copayment structure shifted more costs to them.²

Elasticity of Demand

Studies of the relationship between price and amount of medication consumed, or the price elasticity of demand, were first undertaken thirty years ago.³ When considering the behavioral effects of formulary changes, we are most interested in the extent to which elasticity can vary among classes of drugs. In theory, consumers should have less elastic demand for essential items, so that a price change has a smaller effect on utilization of drugs that are more essential to the consumer.

Researchers have found that the elasticity of demand does differ across classes of drugs. Notably, the first such study, published in 1985, found that elasticity varied not by the long-term medical benefit of the drugs, but by the short-term, obvious benefit to the consumer. Thus, new copayments had no effect on the use of painkillers and sedative/hypnotic drugs, while there were clear reductions in the use of cardiovascular, diuretic, and psychotherapeutic agents when copayments were imposed.⁴

Other studies have attempted to group drugs into “essential” and “non-essential” categories, finding that price increases affect these two categories differently. A peer-reviewed study, published in 2001, focused on increased cost sharing imposed in Quebec. After introduction of the policy, use of “essential” drugs decreased by 9.12% and use of “non-essential” drugs decreased by 15.14%.⁵ Similarly, Medco Health estimates that a 10% increase in cost sharing can slow growth in the use of “essential” medications from about 7% to about 1%, while slowing growth in “less essential” medicines from 14% to -3%.⁶

While most studies have considered the reduction in demand that occurs after copayments increase, the opposite case will also be important in implementation of the Part D drug benefit. It is likely that among beneficiaries who currently have no coverage, utilization will increase. In our model, we do not attempt to simulate either an increase or a decrease in overall demand for drugs. Rather, we hold overall utilization constant, and focus instead on the cross-elasticity of demand.

² Kamal-Bahl, Sachin, and Becky Briesacher, “How Do Incentive-Based Formularies Influence Drug Selection and Spending for Hypertension?” *Health Affairs* 23(1): 227-36, January/February 2004.

³ For example, Phelps, Charles E., and Joseph P. Newhouse, “Coinsurance, the Price of Time, and the Demand for Medical Service,” *Review of Economics and Statistics* 56(3): 334-342, August 1974.

⁴ Reeder, C.E. and Arthur A. Nelson, “The Differential Impact of Copayment on Drug Use in a Medicaid Population,” *Inquiry* 22:396-403, Winter 1985.

⁵ Tamblyn, Robyn, et al., “Adverse Events Associated With Prescription Drug Cost-Sharing Among Poor and Elderly Persons,” *Journal of the American Medical Association* 285(4): 421-429, January 24/31, 2001.

⁶ Medco Health. *Drug Trend Report*. 2002.

Cross-Elasticity of Demand

In response to the relatively recent introduction of formularies in the management of health care costs, there are now studies on the cross-elasticity of demand for prescription drugs – the extent to which consumers will switch from one drug to another in response to differences in price or other barriers. In general, consumers are more willing to switch to another drug in response to price when there are more substitutes available and when substitutes are very similar. Huskamp et al. studied ACE inhibitors, proton pump inhibitors, and statins, three drug classes in which there are several very closely related, substitutable drugs. When an employer switched from a flat \$7 copay to a three-tier system in which employees paid \$8 for generic drugs, \$15 for brand name drugs, and \$30 for non-preferred brand name drugs, 35% to 49% of employees using these drugs switched to a drug in a lower tier after the cost-sharing changes were implemented.⁷

The Veterans Administration (VA) has used a closed formulary for some drug classes in recent years, resulting in substantial shift in market share to the covered drugs and savings in the range of 15 percent for the classes analyzed.⁸ Where a class of drugs was closed, 85% to 97% of the market went to the on-formulary drug (up from 16% to 47% before the class was closed); by contrast, use for the preferred drug in a class where the formulary was not closed rose from 15% to only 23%.⁹ There are some unique features to the use of drugs in the VA system, so generalizing to other environments should be done with caution. Most notably, the VA uses staff physicians who are well-educated about the VA formulary and are expected to prescribe on-formulary drugs.

There is some evidence that the response to formulary decisions can vary considerably by drug class. One article found that the use of formularies for psychotropic drugs was relatively price inelastic.¹⁰ The evidence suggests that good fits between patients and drugs for mental health conditions (e.g., depression) are more idiosyncratic and that bad fits can be very disruptive, making physicians and patients reluctant to change from a proven therapy even when given a significant incentive to do so. They are more likely to choose higher copayments or go through prior authorization procedures to maintain the drug that has been working for them.

Psychotropic drugs may present an extreme case, but other evidence supports the idea that response varies by drug class. A study published in 2004 looks at effects across several major classes of drugs. The research team found that doubling copayments led to reduced use in eight therapeutic classes, with the largest decreases occurring for nonsteroidal anti-inflammatory drugs (NSAIDs) and antihistamines. The smallest reductions were for drugs to treat diabetes, hypertension, and depression. They suggest that the smallest reductions occurred for drugs with greater consequences for missed doses, whereas the largest reductions corresponded to medications taken intermittently to reduce symptoms. This

⁷ Huskamp, Haiden A., Patricia A. Deverka, Arnold M. Epstein, Robert S. Epstein, Kimberly A. McGuigan, and Richard G. Frank. "The Effect of Incentive-Based Formularies on Prescription-Drug Utilization and Spending." *New England Journal of Medicine* 349(23): 2224-2232, December 4, 2003.

⁸ Blumenthal, David, and Roger Herdman, "Description and Analysis of the VA National Formulary," Institute of Medicine, Division of Health Care Services, VA Pharmacy Analysis Committee, 2000.

⁹ Huskamp, Haiden A., Arnold M. Epstein, and David Blumenthal, "The Impact of a National Prescription Drug Formulary on Prices, Market Share, and Spending: Lessons for Medicare?" *Health Affairs* 22(3): 149-158, May/June 2003.

¹⁰ Huskamp, Haiden A., "Managing Psychotropic Drug Costs: Will Formularies Work?" *Health Affairs* 22(5): 84-96, September/October 2003.

finding is accentuated by looking at those patients receiving ongoing care for a chronic illness, for whom drug use was less responsive to copayment changes. There were also higher responses for drugs which had over-the-counter substitutes and for brand drugs versus generic drugs.¹¹ Appendix G provides additional information drawn from the literature on cross-elasticity of demand for various drugs in the model.

If a consumer has found a single drug that works, after having adverse reactions or ineffective results from other drugs, then that consumer will be very price inelastic and so be unlikely to switch drugs. The inclusion of an exceptions process in the presence of formularies is an effort by plans to allow certain patients with highly price inelastic demand for a non-preferred drug to receive the drug. Exceptions are granted in the case of compelling medical reasons for a patient's unwillingness to substitute away from the preferred drug, such as known allergies to alternative medications, but are dismissed if they are based only on taste or tradition. In fact, fail-first requirements (step therapy) are explicit efforts to test whether there are compelling reasons for a particular patient to be price inelastic relative to a drug that he prefers. This approach requires that a preferred product be tried (and fail) prior to the patient receiving permission to use a non-preferred product.

Methodology: The Formulary Simulation Model

This section describes the organization and workings of the model we have developed for ASPE. The model is presented in an Excel workbook in a file that accompanies this report.

Which Drugs Are Included?

For purposes of developing this model, we chose to include six groups of commonly used drugs: anti-depressants, cholesterol drugs, ulcer drugs, diabetes drugs, analgesics, and hypertension drugs. Together, these six groups represent 157 chemical entities (roughly one-sixth of all the drugs on the USP list). They include 149 brand-name drugs and 108 generic drugs. For this analysis, 25 drugs from these groups were excluded because no volume is available in the 2001 MCBS and the drug did not appear on lists of the 200 most commonly used drugs in 2003. The drugs in these six groups represent nearly half (about 49%) of the prescription volume in the 2001 MCBS. The largest number are in the group of hypertension drugs (over half of the total), while the other groups are generally equally represented. In addition, we did not include combination drugs because these drugs are not included on the USP list.

The groups of drugs represent some significant variation with respect to several characteristics. For example, of the chemical entities listed in the cholesterol category, only 38% have a generic option available (Figure 11). By contrast, 97% of the drugs in the analgesic category have a generic option. The varying availability of generic alternatives creates different market situations. While these variations may not affect our substitution model directly, it is important to test the model with these differing situations.

Figure 11. Generic Availability by Therapeutic Category

¹¹ Goldman, Dana P., Geoffrey, F. Joyce; Jose J. Escarce; et al., "Pharmacy Benefits and the Use of Drugs by the Chronically Ill," *Journal of the American Medical Association* 291(19): 2344-2350, May 19, 2004.

Drug Category	Chemical Entities	Chemical Entities With a Generic Option
Anti-Depressants	23	65%
Cholesterol Drugs	13	38%
Ulcer Drugs	11	64%
Diabetes Drugs	13	46%
Analgesics	33	97%
Hypertension Drugs	64	70%

Figure 12. Average AWP for 30 Units, By Drug Category

Drug Category	All	Brands	Generics
Anti-Depressants	\$52	\$66	\$15
Cholesterol Drugs	\$97	\$103	\$38
Ulcer Drugs	\$113	\$125	\$73
Diabetes Drugs	\$36	\$45	\$13
Analgesics	\$65	\$88	\$22
Hypertension Drugs	\$28	\$39	\$15

The drug groups also vary in terms of the pricing levels for the drugs involved (Figure 12). Ulcer drugs and cholesterol agents tend to be the most expensive, averaging \$97 and \$113 for a 30-day supply, respectively. The generic versions of the ulcer drugs are also relatively expensive (\$73), while the generic cholesterol drugs are less expensive (\$38). The diabetes drugs and hypertension medications have the lowest average prices (\$36 and \$28, respectively). Anti-depressants appear to have the largest gap between the brand and generic alternatives. This seems to reflect the difference between the SSRIs (which are mostly sold in brand versions) and the much cheaper tricyclics (which are mostly sold in generic versions).

These differences not only demonstrate the various situations that we are testing with this model, but they also show how this type of analysis can reveal the differences in the different drug categories.

Organization of Drugs Into Groups

The model is organized by “drug substitution groups,” based largely on the USP classification system. We asked our panel of experts to identify groups of drugs within the USP classification scheme that were close equivalents – those that physicians would regularly consider as potential substitutes for each other. In some cases, substitution groups were second-level pharmacologic classes within the USP scheme; more frequently, they were third-level “key drug types.”

We have grouped these drug substitution groups into larger categories, also based on the USP classification scheme and the input of our experts. Each of these larger categories comprises one sheet of the Excel workbook. In many cases, our panel of experts indicated

that it was often possible, but less likely, for physicians to consider different substitution groups within the same category as possible substitutes for each other. As described below, the model allows utilization to shift among drugs in the same substitution group or among related substitution groups located on the same sheet of the spreadsheet.

Fixed Input Data

The model includes several important variables that are considered fixed:

Drug names. Each drug is identified by its brand name and generic name. A separate generic flag indicates whether the drug is available in generic form. Although they are presented on the same line to connote their chemical equivalence, the model includes separate pricing and utilization information for brands and generics.

Drug prices. For each drug, we use Redbook to generate a unit price by taking the median AWP unit price for all strengths and forms. We multiply this unit price by 30 to make the price more comparable to a per-prescription copay. This does not reflect the fact that some drugs are typically taken multiple times a day; it would require additional resources outside the scope of this project to make an adjustment for the number of pills typically taken in one day.

To reflect the relative imprecision of the AWP, we round the approximated per-prescription price to the nearest \$5. This causes drugs with roughly equivalent prices to be treated as though their prices are equal.

Utilization. For each drug, we use the 2001 MCBS to generate utilization. These utilization numbers have not been updated to reflect more recent changes in utilization, such as use of new drugs or shifts to new generics, with the exception of a few new, high-volume drugs for which we imputed utilization (Lexapro, Zetia, and Benicar).

Formulary Data and OOP Prices

The model can accommodate either a closed or an open formulary, with up to four tiers of cost sharing. The user must input two key types of data about the formulary:

Cost Sharing Rules. A plan may follow the statutory model and cover all drugs with 25% cost sharing. Alternatively, a plan may specify different dollar copays or different percentage coinsurance for different tiers of coverage in an effort to steer utilization to certain drugs and lower overall costs. The user describes the plan's tiering structure on the sheet labeled "RULES." On this sheet, the user inputs cost sharing amounts for as many coverage tiers as the plan has. These cost sharing amounts can be entered as either a dollar amount (i.e., \$20 per prescription) or as coinsurance (i.e., 20% of the cost of each prescription).

Tier Placement. The user must also input the tier placement for each drug, on the sheets dedicated to individual drug classes. If a drug is not covered at all, the user enters “0”, and the OOP faced by the beneficiary is the full price of the drug.

As a default, we have entered a simple two-tier coverage scheme into the model. The copayments are \$10 for the first tier (generics) and \$25 for the second tier (brands). In this default scheme, all generics are covered on tier 1, and all brand-name drugs are covered on tier 2.

Out-of-Pocket Cost. The model uses the cost sharing rules and tier placement to generate the OOP cost that the beneficiary will face for each generic drug and each brand name drug. A beneficiary’s OOP cost is limited by the actual cost of the drug: if the drug is on a tier with a copayment higher than the drug’s actual cost, the model assumes the beneficiary would pay the actual cost, not the higher copayment.

Elasticities

Figure 13 provides an example of the elasticities we used for one of the classes in the model. These include three different categories of elasticities that we asked our expert panel to generate:

Brand-to-generic switches. Our expert panel generally agreed that with a large enough difference in price, up to 90% of users might switch to a generic version of the drug they take. We have used 90% as the elasticity for all brand-to-generic switches where a generic is available. The panel identified no exceptions to this generic substitution policy.

Within-group switches. Although substitution groups are defined as groups of drugs that are good substitutes for each other, our expert panel agreed that the likelihood of switching varies from group to group. For example, they agreed that patients would not switch at all from one SNRI to another in response to price, while they agreed that up to 90% of patients might switch from one PPI to another if the price difference were large enough. Within any given substitution group, this elasticity is the same for all drugs.

Across-group switches. The panel agreed that across-group switches were less likely than within-group switches, but that they are possible. For example, they agreed that up to 50% of patients taking a PPI or an H2 Blocker might switch from one group to the other to achieve a large savings. Within any given substitution group, the likelihood of switching out of the group is the same for all drugs.

In general, the panel responded to these questions in terms of the maximum proportion of patients who might switch. We have incorporated this concept into our data by generating a substitution curve along which no patients switch when there is no difference in price, and the maximum number of users switch when the cheapest drug is free. In practice, because no drugs are expected to actually be free, the maximum number of actual switchers when any formulary is entered into the model is likely to be less than the maximum possible number of switchers indicated by our expert panel.

Figure 13. Elasticities Used in Formulary Simulation Model for Cholesterol Category

Drug Substitution Group	Brand Name Drugs	Generic Drugs	Brand Names	Brand-to-Generic Elasticity	Within-Group Elasticity	Cross-Group Elasticity
Statins (Low)	2	1	Mevacor Pravachol	90%	75%	To high statins: 50% To Zetia: 30%
Statins (High)	4	0	Crestor Lescol Lipitor Zocor	No generics	75%	To low statins: 50%
Bile Acid Sequestrants	3	1	Colestid Questran Welchol	90%	90%	None
Fibrates	2	2	Tricor Lopid	90%	90%	None
Lipid Absorption Inhibitors	1	0	Zetia	No generics	Only 1 drug	To low statins: 30% To nicotinic acid: 10%
Nicotinic Acid	1	1	Niacin	90%	Only 1 drug	To Zetia: 10%

Outcomes and Summary Measures

The model generates summary measures of coverage, volume, and spending (both total and out-of-pocket). These are presented at the class level on the “summary” sheet, and at the substitution group level on the sheets labeled “cov”, “vol”, and “spend.”

Coverage. The model summarizes the tier placements that the user input at the drug level. This information can be helpful in analyzing the different results of formularies with different coverage policies.

Volume. The model generates a summary of how many drugs are on each drug. The model also shows the percentage change in volume. To provide context, we also show the volume for each group as a percentage of the class and as a percentage of all drugs in the model, both before and after switching. In addition, the model displays the percentage of drugs that have a generic option, and the percentage of volume that is in generic drugs.

Spending. The model generates a “spending” number that provides an estimate of volume that is weighted by the price of each drug. We have not calibrated these spending figures to any available data on actual spending; they are based on the AWP, which we know is an inaccurate measure of spending. However, these weighted estimates are useful as a tool to see the relative magnitude of changes in spending, which can be quite different from changes in volume.

The model generates a weighted average total price per prescription based on this AWP-based price, and the average OOP cost per prescription based on the formulary cost sharing rules. The model estimates the share of total spending that beneficiaries would spend out of pocket. In addition, the model includes a measure of on-formulary OOP spending as a share of on-formulary spending. This amount,

which is called “True Out-of-Pocket” (TrOOP) spending by the MMA, must be equal to 25 percent under the actuarial equivalence rules.

Caveats and Limitations

There are a number of key caveats and limitations in our development and analysis of the model. For example, the model is only attempting to portray the period after beneficiaries meet their deductible and before they reach the “donut hole.” We do not model any changes in behavior or spending for other times when beneficiaries may face different incentives.

The total number of prescriptions is fixed within each class. The model does not simulate people dropping use of a drug altogether because the cost is too high. Similarly, we do not estimate any new users who might begin taking a drug because they now face a lower price.

The model is not constrained by any measures of actuarial equivalence. The user can input any combination of cost sharing rules and tier placement. However, in the examples we have created, we have used cost sharing rules that result in TrOOP spending that would meet the 25% requirement.

Our baseline utilization data include some generics that were new at the time the 2001 MCBS was collected, and thus have very low utilization. This sometimes results in very large switches from brand to generic. The baseline data also fail to include some new products that have been introduced since 2001 and includes products that have been withdrawn from the market. In addition, our use of 2005 prices with 2001 utilization can cause some inconsistencies, although we have imputed data for a few of the more extreme cases.

Prototype Formularies in the Model

Using the model, we analyzed the variations in: 1) cost sharing and 2) the number of drugs covered for a number of different hypothetical formularies. Our analysis focused on the amount of switching and total spending that each formulary’s distinct design produced.

Cost Sharing

We examined the effects of using a flat co-payment (\$14) versus a flat coinsurance rate (25%), as well as the effects of varying the tiered cost sharing rates for brand and generic drugs (15% vs. 35%). In all formularies, we assumed that all drugs were covered and that the cost sharing expenditures equaled 25% of the overall spending (in accordance with the MMA specifications).

As shown in Figure 14, our analysis found that flat co-payments produce less switching than coinsurance (18% versus 39%) because flat co-payments induce less price sensitivity than coinsurance. Individuals who are responsible for only a flat co-payment of \$14, regardless of a drug’s actual costs, have less incentive to switch to a cheaper drug than individuals who are responsible for a certain portion of a drug’s actual costs. The only exception to this finding occurred in circumstances when there was only a brand (and no generic) drug available.

Compared to a constant coinsurance rate of 25%, varying coinsurance to a 15% rate for generic drugs and a 35% rate for brand names results in still more switching.

In all cost sharing scenarios, both total spending and the average OOP spending decrease as the amount of switching increase. Plans that induce more switching may be attractive to both PDPs and consumers as a result of these lower overall costs.

Figure 14. Model Results for Varying Cost Sharing Scenarios

Cost Sharing	% of Brand Switching to Own Generic	% of Total Switching to New Chemical	Average Total Price per Prescription	Average OOP per Prescription
\$14 for all drugs	2%	18%	\$43	\$11
25% for all drugs	13%	39%	\$33	\$8
15% generics, 35% brand	30%	42%	\$31	\$8

Number of Drugs Covered

To determine the effects of altering a formulary’s scope, we analyzed five separate prototypical formularies, varying from extremely broad (covering all drugs) to extremely narrow (covering only the CMS minimum). We assumed that all plans had a single coinsurance rate of 25%.

As shown in Figure 15, we found that plans that covered fewer drugs produced more switching. However, some consumers in our model refuse to switch from their off-formulary drugs, resulting in those consumers paying the full cost of the drug. Thus, while more stringent plans managed to lower the average total cost per prescription through switching, they also raised the average OOP costs for consumers, because some had to pay the full cost of their off-formulary drugs.

Figure 15. Model Results for Formularies Covering Varying Numbers of Drugs

Formulary	Drugs covered	% of Brand Switching to Own Generic	% of Total Switching to New Chemical	Prescriptions Remaining Off Formulary	Average Total Cost per Prescription	Average OOP per Prescription
All Covered	257	13%	39%	0	\$33	\$8
Plan A	182	10%	38%	2%	\$34	\$9
Plan L	150	29%	39%	5%	\$33	\$9
Generics Only	120	36%	44%	13%	\$31	\$14
CMS Minimum	56	25%	45%	20%	\$31	\$14

Policy Implications: Analyzing Prototype Formularies

This analysis of simplified prototype formularies offers some insight into how formulary variations will affect beneficiaries and drug utilization. Thus, we provide some indication that the use of coinsurance, compared to flat copayments, retains more differences in prices and thus lead to more switching of drugs. Furthermore, more switching results when brands and generics are assigned different cost sharing amounts. As the amount of switching increases, both total spending and out-of-pocket spending go down.

The number of drugs on a formulary matters as well. As fewer drugs are covered, more prescriptions are switched. Because some do not switch for reasons such as brand loyalty, some beneficiaries may pay for the full cost of off-formulary drugs. Overall costs go down with tighter formularies, but some of that is at the expense of higher average costs paid by beneficiaries out of their own pockets. While official TrOOP spending will be held at 25% by design under the MMA, total out-of-pocket spending goes up when more drugs are excluded from a formulary.

None of these results are unexpected and some have been seen in some of the cited literature. But this additional verification is helpful and further analysis should reveal more nuances.

“Real World” Formularies in the Model

We also used our model to analyze two formularies—Plan A and Plan L—that are loosely based on two actual commercial formularies currently on the market. Plan A excludes 75 drugs (out of a possible total of 257 drugs in the model), and has 3 cost sharing tiers: \$10, \$25, and 50%. Plan L, on the other hand, excludes 106 drugs (out of a possible 257), and has only 2 cost sharing tiers: 10% and 40%.

Our results indicated that Plan L’s more stringent design fostered a greater amount of switching, especially to generic drugs. Thus, even though Plan A initially covered both a greater number and higher volume of drugs, Plan L covered more volume than Plan A after switching occurred. In fact, the amount of volume that Plan A covered was actually diminished by the switching that occurred because some off-formulary drugs are actually cheaper than the on-formulary cost sharing rate (especially the 50% coinsurance rate for Plan A’s Tier 3).

The greater amount of switching that Plan L generates results in a greater reduction in total spending (a 35% reduction versus Plan A’s 19%). At the same time, OOP spending is lower for Plan L than Plan A (24% versus 32%). Plan L also results in lower TrOOP spending than Plan A (21% versus 31%), although any formulary meeting MMA specifications would need to maintain TrOOP spending at a maximum of 25%.

Policy Implications: Potential for Risk Selection

When comparing the two formularies by drug class, we discovered that Plan A costs more for every class of drug except cholesterol drugs, making Plan A attractive for those who take only cholesterol medication. Alternatively, our prototypical Minimum Plan is substantially more expensive for cholesterol drugs, making this plan very unattractive for cholesterol patients (although the Minimum Plan is a prototype, it demonstrates the capacity for severe price differentials that actual stringent plans may create). Moreover, Plan L's hypertension drugs cost only one-fifth as much as Plan A's (\$2 versus \$10), making Plan L particularly attractive those taking hypertension medication.

Hence, each plan has the potential to create risk selection among consumers. Our model may be helpful in identifying these types of situations. What this looks like in actual practice is less clear, however. Consumers are unlikely to have access to such specific detailed formulary information, such as average cost by drug class, but they may see these price differences when looking at the cost of their particular medications. However, these differences may also be masked when a consumer takes more than one class of drug.

Potential for Refining the Model

Our model can be further refined in various ways. Some of these are relatively simple expansions of the model, while others attempt to incorporate more complex behavioral assumptions.

To make this tool as relevant and accurate as possible, we could make the baseline drug volumes specific to the Medicare-eligible population. This would require a more intensive analysis of survey data. Similarly, we could further adjust our elasticities, perhaps specifically for the Medicare-eligible population, by expanding our panel of experts and using them to assess and refine our elasticity assumptions. Also, the model could be expanded to include a both wider range of drug classes (it currently covers only six classes, which equals approximately 50 percent of total drug volume for 2001), and combination drugs, which we estimate account for about 15% of Medicare beneficiaries' drug usage/volume.

The assumptions behind our model could also be expanded to allow for increases and decreases in overall volume. Our model currently assumes that if a medication becomes off-formulary, its users will either switch to an on-formulary alternative or continue taking the off-formulary version, paying its full cost. In reality, however, a patient may be unwilling to switch brands and unable to pay for the full cost, and decide to stop taking the medication entirely. Similarly, a previously uninsured individual may decide to begin taking a new medication now that it is covered by insurance. Decisions such as these to stop or start taking medications will affect the volume of each individual drug, as well as the overall drug volume being consumed in the United States. Modifying our model to account for this behavior will improve its accuracy.

Finally, our model could be made more dynamic by allowing prices to fluctuate in response to volume shifts (a higher volume will result in a reduced unit price). This enhancement would reflect the expectation that manufacturers would normally offer a lower price (often through a larger rebate) in response to an increased market share. This would also improve our model's exactness, as "switchability" output becomes more precise.

