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Health Care Cost Trends

Modeling Effects of Enrollee Choice

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Executive Summary

In health insurance marketplaces, prospective insured individuals and groups are able to choose from a range of available plans. Additionally, many marketplace environments, including the Federally Facilitated Marketplace, provide tools for these insurance shoppers to estimate possible out-of-pocket costs under various plans based on the experience of other individuals with similar demographic or clinical profiles. Although both decision support tools and a variety of available plans improve the shopping experience, they also increase the risk that insured individuals will select against the insurers. That is, shoppers will choose plans that more closely match their own anticipated health care needs than they would in the absence of such information. This study uses health care encounter data to simulate the choices faced by health insurance shoppers under a variety of conditions and measures the simulated effect of increased consumer choice and consumer information on medical loss ratios and, as a consequence, insurer profitability.

Section 1: Premise and Motivation

The entire concept of a multiplan health insurance marketplace is centered around individual choice, specifically regarding plan parameters such as deductibles, copays, and out-of-pocket maximums. Prospective enrollees are not simply provided with a single plan design and its corresponding price, such as in traditional fee-for-service Medicare but may have a wide range of plans from which to choose. For the 2020 open season, over two-thirds of enrollees have access to three or more insurers offering plans on the marketplace in their counties.[1] Each of these insurers may have multiple offerings at different metal levels, presenting a potentially confusing array of choices.

Although increased enrollee choice is generally viewed as a net positive for consumers, increases in the number of different plans available also magnify the opportunity for enrollees to *select against* the insurers in the marketplace. That is, with a larger number of plans available, enrollees will more readily be able to match plan parameters to their own anticipated health care needs. For example, an individual with high anticipated brand pharmacy needs will be attracted to plans with minimal cost sharing on brand drugs. In contrast, an individual expecting to require surgery in the plan year may be more attracted to plans with low or zero deductibles for outpatient hospital services. Increased enrollee choice directly corresponds to increased opportunity for selection and, consequently, higher premiums.

A second factor that goes hand in hand with the effect of increased choice is the degree to which enrollees are able to anticipate health care needs. Although some portion of health care utilization is inherently unpredictable, actuaries and underwriters know that some personal characteristics (including but not limited to demographics and chronic disease burden) do correspond to utilization and cost levels. In fact, many exchanges provide decision support tools to help estimate likely out-of-pocket costs under different scenarios. On the Federally Facilitated Marketplace, prospective enrollees can enter their age, gender, and a qualitative evaluation of health status, and the website will return a specific dollar amount of expected cost sharing for each available plan. Plans are then ranked by either enrollee premium or estimated total out-of-pocket expenses, including both premium and estimated cost sharing. The presence of these decision support tools increases the ability of consumers to predict their future health care expenses under different hypothetical plan selections and select an optimal plan.

Although this confluence of plan availability (choice) and information could increase enrollee satisfaction by optimally pairing enrollees to their optimal plans, there is a downside that the selection effects that this breeds may contribute to increased premiums for all enrollees. This research effort demonstrates the potential magnitude of this selection effect in a series of model marketplaces using different plan combinations and decision strategies. The actual effects of this behavior may be muted by suboptimal decision making, but the research illustrates the direction and potential upper bound of these effects.

[1] R. Fehr, R. Kamal, and C. Cox, Insurer Participation on ACA Marketplaces, 2014–2020, November 21, 2019, Kaiser Family Foundation, https://www.kff.org/private-insurance/issue-brief/insurer-participation-on-aca-marketplaces-2014-2020/.

Section 2: Model Mechanics

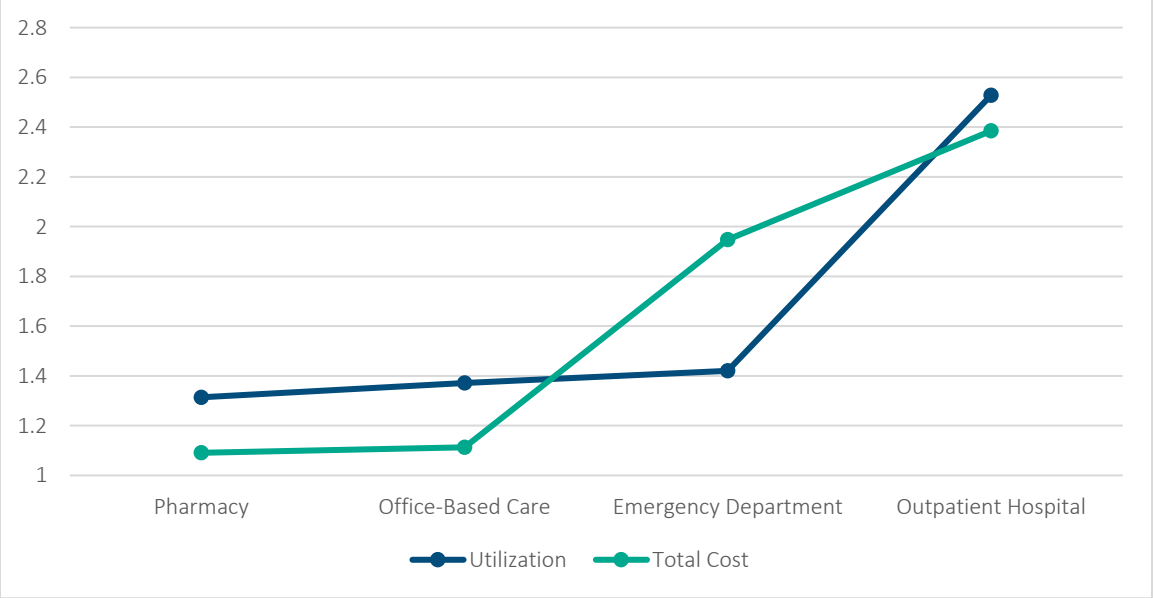
2.1 DATA SOURCE

The enrollee choice simulation model was developed using a sample of families from the Medical Expenditure Panel Survey (MEPS).[2] MEPS has been produced annually by the Agency for Healthcare Research and Quality since 1996 and provides health care utilization and cost data, paired with detailed demographic information from the Current Population Survey.

The sample of families for the simulation was drawn from families that were present in both the 2015 and 2016 surveys. This allowed for the use of prior year health care utilization to be used as a decision rule for the subsequent year. Additionally, to reflect more closely the dynamics of the non-Medicaid marketplace population, we have included only those families indicating an income of at least 100% of the Federal Poverty Line (FPL).

One challenge presented by MEPS is that health care utilization and spending data are known to be underreported by survey respondents.[3] Zuvekas compared MEPS data to utilization and cost data in comparable databases produced by Truven (now IBM Watson) and Optum and found that pharmacy, emergency department, outpatient hospital, and office-based care are all significantly underreported in MEPS. For each of these four categories of service, we calculated the average of the indicated underreporting adjustment from the two comparison databases to determine factors to adjust our MEPS sample data. These adjustment factors are shown in Figure 1.

Figure 1
MEPS Underreporting Adjustment Factors by Service Type



[2] Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, https://www.meps.ahrq.gov/mepsweb//.
[3] S. Zuvekas, Comparing MEPS Use and Expenditure Estimates for the Privately Insured to Truven MarketScan® and OptumLabs™ Claims Data, 2008–2013, October 2017, Agency for Healthcare Research and Quality, https://www.meps.ahrq.gov/data_files/publications/workingpapers/wp_17001.pdf.

A second challenge presented by the use of MEPS data is that the categories of care are not highly granular. For example, prescription drugs are reported in total, not separately for brand and generic. Also, office visits are not specified as primary care or specialty. Although these distinctions (brand versus generic and primary care versus specialty) are common differentiators in benefit packages, we were constrained by this aggregation to vary cost-sharing levels only at the total prescription drug or total office visit level.

We aggregated individual records at the family unit level (to reflect the level at which health insurance purchasing decisions would typically be made). We retrieved allowed cost and utilization data for office-based physician care and pharmacy. We retrieved only cost data for categories of care that were modeled on a deductible and coinsurance basis (i.e., without a "per service" cost-sharing mechanism). These categories included chiropractic, office-based nondoctor, optometrist, physical therapy, outpatient facility, emergency department, inpatient, and home health.

In total, the MEPS sample includes 4,989 families and 11,552 individuals. Here 42% of families are single individuals, 21% are families of two, 14% are families of three, and 23% are families of four or more. We also tabulated the distribution by family income. This distribution is shown in Table 1.

Table 1
Income Distribution of MEPS Sample

	Individuals (%)	Families (%)
100%–133% FPL	1,209 (10%)	492 (10%)
133%–150% FPL	553 (5%)	230 (5%)
150%–200% FPL	1,523 (13%)	655 (13%)
200%–250% FPL	1,305 (11%)	578 (12%)
250%–300% FPL	1,125 (10%)	446 (9%)
300%–400% FPL	1,714 (15%)	753 (15%)
Above 400% FPL	4,123 (36%)	1,835 (37%)

2.2 SIMULATION MODEL

The Excel-based simulation model presents the sample of 4,989 families with any number of health plan options, and the families' simulated decisions are modeled using a series of predefined decision rules. The plan options are defined using parameters that are consistent with data available in MEPS. All plans have a defined deductible, coinsurance rate, and out-of-pocket maximum. Outpatient pharmacy (generic and brand combined) and office visits (all specialties) can be set to either fixed-dollar copayments or can be integrated with the other types of care that are subject to deductible and coinsurance. As in the federal marketplace, all types of care apply to the out-of-pocket maximum. The model is designed so that individual plans in the list can be toggled on and off for inclusion in each simulation.

Each plan in a simulated model marketplace is rated using the sample families from MEPS. The cost-sharing provisions from each plan are applied to the underreporting-adjusted MEPS cost and use data, and an average plan liability is calculated. This is divided by the assumed pricing loss ratio (we have used 85% for all plans in this study). The resulting base premium is then used to compute the total family premium for each simulated family. This family-level premium calculation is done in accordance with Affordable Care Act (ACA) rules, using all adults and the three oldest children within each family. The standard age curve values are used for the family premiums, with the average family having a total premium factor of 3.12. We will discuss the approach for the premiums under the subsidized model in a later section.

For the plan selection simulation, a baseline scenario is developed with each family randomly choosing from among the available plans. We then simulate each family's decision with three additional decision rules. The first is simply the lowest premium plan. Although this is a generally uninteresting data point because the lowest premium plan is

the same for every family, it does reflect the tendency among actual health insurance shoppers to purchase lower cost plans. The second strategy uses the family's prior year costs to estimate the optimal plan for that family in the subsequent year. This strategy is most similar to that which could reasonably be modeled by a decision support tool. Families generally at least have access to information on their health care utilization in the recent history, so projecting this forward onto potential plans for the subsequent year is a reasonable step. Finally, we have used the family's actual future year costs to determine the optimal plan—that is, the plan that will actually be the lowest cost in the coming year, considering premiums and cost-sharing expense. This approach reflects what a family would choose with perfect foresight and represents the maximum degree of exposure to selection that could be experienced in a marketplace.

2.3 OUTPUT MEASURES

The model returns several key measures of interest for each simulation. First, the market-level medical loss ratio (MLR) is calculated under each decision rule. For the random choice and lowest premium scenarios, the expected value of the market-level MLR is equal to the pricing MLR (with some variation due to random variation). The prior year scenario typically results in a higher MLR, with the perfect foresight scenario being higher still. These higher MLRs for the additional information known to the shoppers are a result of selection. Then the difference in MLR between prior year/perfect foresight and the baseline random scenario represents the average issuer margin lost to selection under each decision rule.

In addition to that key metric of the amount of issuer margin lost, we have also calculated the percentage of times that the plan selected using the prior year information turns out to be optimal. This value is higher than the random choice approach and tends to increase slightly with increasing family size. We have also calculated the mean monetary difference between the random choice and both the prior year and perfect foresight approaches. This represents the average amount of money that an enrolled family would benefit by using the available information to select their health plan versus choosing randomly. This also tends to increase as family size increases.

Section 3: Results

3.1 TWO-PLAN MARKET

As the starting point for the analysis, we first modeled a two-plan marketplace with plans that share an approximately equal actuarial value. The key cost-sharing provisions for these two plans are illustrated in Table 2. The two plans were selected so that one plan would be more attractive to families who rely more heavily on office visits and the other to families who rely more heavily on prescription drugs. Both plans were priced with an 85% allowable loss ratio.

Table 2
Two-Plan Market Cost Sharing

Plan 1	Plan 2
$10 Office Copay	Office Subject to D&C
$50 Pharmacy Copay	$15 Pharmacy Copay
$1,000 Deductible	$2,000 Deductible
10% Coinsurance	10% Coinsurance
$7,500 Maximum OOP	$7,500 Maximum OOP
$2,923 Base Premium	$2,936 Base Premium

Note: D&C = deductible and copay; OOP = out-of-pocket.

With only these two plans in the market, we found only a very small impact on marketwide MLRs when using the "prior year" decision rule. The marketwide MLR was only about 0.1% higher when using the prior year rule compared to a random selection between the two plans. However, if each family were able to select the optimal plan (the perfect foresight decision rule), the market MLR was found to be 88.8%, representing 4.5% in lost margin.

We also found modest impacts at the family level in the two-plan market. As a control, each family was assigned a plan randomly. In the two-plan market, the probability that the randomly selected plan is in fact the optimal plan for a family is 50%. (This was true both in theory and in the actual simulation results.) When prior year utilization was used as a decision rule for the two-plan market, 73% of families were able to make an optimal decision. However, the mean financial improvement from using the prior year information compared to a random choice was only $11 per family. This increased significantly to $357 per family for the value of perfect foresight into the plan year's health care costs and use. Thus, $11 to $357 represents the range of values for an average family of consumer information and decision support in this simulated two-plan market.

3.2 EIGHT-PLAN MARKET

The next set of simulations tested the effect of a wider range of available plans, recalling the hypothesis that selection effects will increase as the number of available plans increase. The eight plans included in this simulation are shown in Table 3.

Table 3
Eight-Plan Market Cost Sharing

Cost-Sharing Element	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7	Plan 8
Office Copay (or D&C)	$10	$50	$20	D&C	D&C	D&C	$10	D&C
Pharmacy Copay (or D&C)	$50	$0	$20	D&C	D&C	D&C	D&C	$15
Deductible	$1,000	$2,500	$1,750	$1,000	$1,500	$250	$1,500	$2,000
Member Coinsurance	10%	10%	15%	15%	10%	25%	20%	10%
Maximum OOP	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500
Base Premium	$2,923	$2,936	$2,884	$2,908	$2,911	$2,884	$2,925	$2,879

Note: D&C = deductible and copay; OOP = out-of-pocket.

The eight-plan market showed much stronger selection effects than the two-plan market. Using prior year information, the marketwide MLR in this simulation was 86.6%, representing 1.9% of lost margin compared to the target MLR of 85.0%. The upper bound of lost margin in this model market is 8.0%, with the marketwide MLR resulting from families making choices with perfect foresight at 91.8%.

The percentage of families who would have been able to make the optimal choice with prior year utilization information was 25%, about double the baseline one-in-eight chance with a random selection. On average, using prior year information resulted in a financial advantage of $135 per family. This was lower for families of one and two, at $97 and $106 respectively, but approximately the same ($194) for different family sizes with more than two persons. The value of having perfect foresight was much larger, at $606 across all families. This varied from $449 for families of one individual to $713 for families with more than two or more.

We found that by varying the specific plans available, the results of the simulation did vary, particularly with smaller numbers of plans. To mitigate this effect, we constructed a batch processor that could first randomly select which plans would be available in the model market and then simulate the choices made by each family within each simulated market. For the eight-plan marketplace, we performed 5,000 simulations of markets using randomly determined combinations of plans. Table 4 summarizes the results from this batch simulation. We have displayed both the selection effect (lost issuer margin) and the mean value of information for both the "prior year" and "perfect foresight" models. Table 4 neatly summarizes the dual hypothesis that this project aimed to illustrate: that as both consumer information and plan availability increase, issue margin will decrease.

Table 4

Simulation Results: Batch Processing of Eight-Plan Marketplace

	Selection Effect		Mean Value of Information	
	Prior Year	Perfect Foresight	Prior Year	Perfect Foresight
2 Plans	0.2%	3.4%	$18	$261
3 Plans	0.7%	5.1%	$57	$390
4 Plans	1.2%	6.1%	$94	$471
5 Plans	1.6%	6.8%	$118	$522
6 Plans	1.8%	7.3%	$136	$563
7 Plans	2.1%	7.7%	$161	$595
8 Plans	2.2%	8.0%	$170	$618

3.3 EIGHT-PLAN MARKET: DIVERSE PLANS

Thus far, all plans used in the sample markets have had approximately the same level of benefit richness, with base premiums of approximately $3,000 per year. In the following discussion, we performed the same batch-processed simulation, but with a selection of plans that varied more considerably in richness. For this test, the eight plans' base premiums ranged from a low of $2,375 to a high of $3,287, about a 38% spread. The detailed parameters are summarized in Table 5.

Table 5

Diverse Eight-Plan Market Cost Sharing

Cost-Sharing Element	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7	Plan 8
Office Copay (or D&C)	$10	$50	$25	D&C	D&C	D&C	$10	D&C
Pharmacy Copay (or D&C)	$20	$10	$30	D&C	D&C	D&C	D&C	$10
Deductible	$250	$3,000	$2,500	$1,000	$1,500	$5,000	$5,000	$250
Member Coinsurance	10%	10%	15%	10%	20%	25%	30%	5%
Maximum OOP	$5,000	$7,500	$7,500	$7,500	$7,500	$7,500	$5,000	$5,000
Base Premium	$3,181	$2,801	$2,767	$3,007	$2,746	$2,375	$2,734	$3,287

Note: D&C = deductible and copay; OOP = out-of-pocket.

In a market with a wider range of benefit richness in the available plans, we found much larger effects on issuer margin and a much higher monetary value of information. This is expected, as essentially more is at stake in the plan selection decision when the families are able to choose from a wider range of available plans. These results are summarized in Table 6.

Table 6

Simulation Results: Batch Processing of Diverse Eight-Plan Marketplace

	Selection Effect		Mean Value of Information	
	Prior Year	Perfect Foresight	Prior Year	Perfect Foresight
2 Plans	1.0%	6.1%	$104	$477
3 Plans	1.8%	9.4%	$175	$726
4 Plans	2.3%	11.4%	$202	$877
5 Plans	2.5%	12.6%	$214	$969
6 Plans	2.8%	13.9%	$231	$1,064
7 Plans	3.1%	14.8%	$251	$1,137
8 Plans	3.2%	15.6%	$257	$1,197

3.4 SUBSIDIZED MARKET

We performed a final series of simulations to determine the effects of adding a premium subsidy mechanism to the model market. We have modeled the subsidy structure after the premium subsidy available in the ACA marketplace. First, the annual dollar amount of the subsidy available to each family was determined according to the family's income compared to the calendar year 2020 subsidy guidelines. For those families with incomes below 133% of the FPL, the after-subsidy premium cost of the benchmark second-lowest silver plan is limited to 2.06% of family income. This limit increases to a maximum of 9.78% of income for families between 350% and 400% of the FPL. Families with incomes above 400% do not receive a premium subsidy. The fixed-dollar subsidy amount is then determined by subtracting the limit from the premium for the benchmark plan. The final subsidized premium is calculated for each plan by subtracting the fixed-dollar subsidy amount from the plan-specific premium.

We calculated the effects of this premium subsidy structure on both the equal-value plans shown in Table 3 and the more diverse market shown in Table 5. The results of these simulations are shown in Tables 7 and 8.

Table 7

Simulation Results: Batch Processing of Uniform Eight-Plan Marketplace

	Selection Effect		Mean Value of Information	
	Prior Year	Perfect Foresight	Prior Year	Perfect Foresight
2 Plans	0.2%	3.1%	$14	$243
3 Plans	0.6%	5.0%	$47	$387
4 Plans	0.8%	6.0%	$65	$465
5 Plans	1.1%	6.7%	$89	$518
6 Plans	1.4%	7.1%	$106	$551
7 Plans	1.6%	7.5%	$121	$582
8 Plans	1.9%	8.0%	$149	$617

Table 8

Simulation Results: Batch Processing of Diverse Eight-Plan Marketplace

	Selection Effect		Mean Value of Information	
	Prior Year	Perfect Foresight	Prior Year	Perfect Foresight
2 Plans	0.9%	6.5%	$117	$511
3 Plans	1.6%	9.1%	$158	$708
4 Plans	2.1%	11.4%	$190	$874
5 Plans	2.5%	12.6%	$213	$968
6 Plans	2.7%	13.5%	$225	$1,040
7 Plans	3.0%	14.8%	$247	$1,136
8 Plans	3.4%	15.7%	$271	$1,202

For enrolled families who received a premium subsidy, plan cost sharing will comprise a larger percentage of out-of-pocket spending. Because cost sharing is less predictable than plan premiums, this might lead to the expectation that selective effects could be more readily seen in a subsidized marketplace. However, our simulations show that the effects in the subsidized market are very similar to those seen in the unsubsidized markets. For the diverse marketplace, we found selection effects of 3.2% using the prior year decision rule and 15.6% with perfect foresight. These effects grew only slightly to 3.4% and 15.7%, respectively, in the subsidized simulation. Results with other

numbers of plans show a similarly negligible difference. We believe that the similar results stem from the fact that the premium subsidy is a fixed-dollar subsidy, applied equally to all plans. When determining the optimal plan, the total out-of-pocket spending (subsidized premiums and cost sharing) is compared across all plans to determine the minimum. Because of the fixed-dollar nature of the premium subsidy, the optimal plan would rarely be changed by the presence of the premium subsidy.

3.5 CONCLUDING REMARKS

The intent of this study was to test and demonstrate the possible magnitude of the impact on insurer margin of consumer choice and consumer information in the individual marketplace. We found, as expected, that health care costs do increase when consumers are provided with additional choices and with additional information about their own expected out-of-pocket expenses under the range of available plans. Both of these elements lead to increased opportunity for consumers to select against the issuers. Although consumer choice and consumer information are both objectively good for consumers, there are negative consequences for the issuers writing the health policies.

This study has demonstrated, under simulated market conditions, that the potential magnitude of these selective effects could be quite high. For example, in our eight-plan diverse market, consumers with perfect foresight into their utilization and costs for an upcoming plan year could erase over 15 percentage points of issuer margin. If that selective behavior is already built into a plan's experience, then the implication is that rates are 15 percentage points higher than they would be in a single-plan environment. However, the silver lining is that consumers do not have perfect foresight into upcoming health expenses. The unpredictability of health care expenses makes this level of selective behavior essentially impossible. However, rational consumers armed with information about their own experience in a prior year could still make a significant impact on health care expenses.

An additional finding of this research is that the fixed-dollar nature of premium subsidies available on the ACA marketplace does not further enhance enrollees' ability to select against issuers. Because the subsidies are generally a fixed-dollar amount, the additive difference between multiple plans is largely unchanged whether the plans are subsidized or not.

Based on these results, the most important takeaway is still directional. Additional options—through competition or just expanded plan offerings—come with some incremental price in the form of increased selective behavior. Additionally, consumer-facing decision support tools will further enhance opportunities for enrollees to make decisions in their own best interest, which ultimately will drive up base costs for all enrollees.

Section 4: Acknowledgments

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