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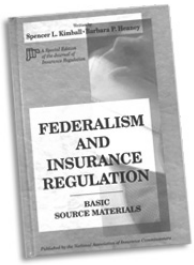

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Prescription Drug Insurance Plans: Potential Cost Reductions and the Pass-Through of Manufacturer Pharmaceutical Rebates to Premiums

Charles C. Yang*

Abstract

In response to the recent moves to reduce prescription drug expenses and eliminate manufacturer pharmaceutical rebates for Medicare and Medicaid, this research investigates the pass-through of manufacturer pharmaceutical rebates to premiums and examines the potential prescription drug cost reductions through efficiency improvement. The results indicate that eliminating all pharmaceutical rebates but using 50% of the eliminated rebates to lower prescription drug list prices, the premium per member month would increase by $8.6 for the whole comprehensive line, and $19.1 for Medicare Advantage. Using the median efficiency as the efficiency goal, the total cost reductions on hospital/medical expenses, prescription drug expenses, and other expenses are always more than enough to offset any potential premium increases due to the elimination of pharmaceutical rebates, no matter how much of the eliminated rebates are used to lower prescription drug list prices.

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Introduction

High prescription drug costs are a persistent issue with consumers and policymakers (Bishop, 2018). Inflation-adjusted retail prescription drug spending per capita in the U.S. increased from $90 in 1960 to $1,025 in 2017 (Kamal, Cox and McDermott, 2019). Total reimbursement for all brand-name drugs in Medicare Part D increased by 77% from 2011 to 2015 (62% after manufacturer rebates) (HHS, 2018a). One of the top priorities of the Trump Administration is to reduce the price of prescription drugs (HHS, 2018b). In May 2018, the U.S. Department of Health and Human Services (HHS) released the "American Patients First" blueprint, a comprehensive plan to lower drug prices and reduce out-of-pocket (OOP) costs (HHS, 2018b). Furthermore, in January 2019, the HHS issued a proposed rule to eliminate manufacturer rebates to plan sponsors under Medicare Part D, Medicaid managed care organizations (MCOs), or the pharmacy benefit managers (PBMs) under contract with them, in exchange for potential point-of-sale price reductions on prescription drugs (HHS, 2019). Even though the proposed rule was withdrawn in July 2019, it raised the question of how pharmaceutical rebates affect all the stakeholders, and it also drew more attention to necessitated regulatory reforms to reduce prescription drug expenses. Correspondingly, this research is designed to investigate the pass-through of manufacturer pharmaceutical rebates to premiums and examine the potential cost reductions on prescription drug expenses through promoting efficient practices of health insurers. This research aims to inform the public and provide insights to all the stakeholders on the treatment of manufacturer pharmaceutical rebates and prescription drug cost savings.

Prescription drugs are composed of generic, brand and specialty drugs. Generic drugs are of the lowest cost, while brand and specialty drugs are more expensive. The coverage preference and differential cost sharing are specified in the health insurer's formulary, which lists the covered prescription drugs in multiple tiers. Generally, Tier 1 is limited to generic drugs, Tier 2 preferred brand drugs and more expensive generics, Tier 3 non-preferred drugs, and Tier 4 specialty drugs (Torrey, 2018). There are two types of formularies: the closed formulary (only prescription drugs on the list are covered) and the open formulary (prescription drugs not on the formulary list may also be covered). Health plans are increasingly using the limited and closed formulary to rein in prescription drug costs (Managed Healthcare Executive, 2015). Additionally, health insurers frequently employ utilization management in their prescription drug benefits, particularly for high-cost medications. Common utilization management techniques for prescription drugs include prior authorization, step therapy, quantity limits, and mandatory generic substitution (American Cancer Society, 2014). Wen et al. (2017) find that prescription drug monitoring mandates are associated with a reduction in opioid prescriptions. Best practices in formulary controls and utilization management (among others) enhance the efficiency of health insurers in minimizing medical costs to provide a given level of medical services.

In the literature, data envelopment analysis (DEA) has been utilized to identify efficient and inefficient health plans; and for inefficient plans, the DEA generates efficient target levels of "inputs" and "outputs" required to bring the plan into efficient operation (Brockett, Golden and Yang, 2018; Yang and Wen, 2017). Brockett, Golden and Yang (2018) apply DEA to assess the potential savings of Medicare obtainable through optimally efficient implementation of Medicare accountable care organizations (ACOs) and Medicare Advantage plans. Similarly, Yang and Wen (2017) uses DEA to examine the potential cost reductions for the consumer operated and oriented plans (CO-OPs). Both of these two studies analyze hospital and medical expenses, claim adjustment expenses, and administrative expenses. This current research contributes to the literature by adopting the DEA approach to explore efficient prescription drug expenses and potential cost reductions of prescription drug insurance plans.

The prescription drug distribution chain consists of six stakeholders: pharmaceutical manufacturers, PBMs, health insurers (including self-insured employers), wholesalers, pharmacies, and patients (Dieguez, Alston and Tomicki, 2018). PBMs are hired by health plans to help manage their prescription drug benefits, such as setting up retail pharmacy networks and negotiating rebates with manufacturers (Roehrig, 2018). The PBM business is highly concentrated with the three largest PBMs—i.e., Express Scripts, CVS Health and OptumRx—accounting for about two-thirds of the whole market (Roehrig, 2018). To secure a preferred placement on the formulary of a health plan, the pharmaceutical manufacturer generally pays prescription drug rebates to the health insurer directly, or oftentimes through the PBM, which might retain a portion for its own compensation. Manufacturer rebates are typically a percentage of a drug's list price. Shepherd (2019) argues that PBMs' profit incentive often conflicts with efforts to minimize drug costs for drug plans and beneficiaries. The government is concerned that the rebate-based system might encourage higher list prices of prescription drugs (for more rebates) and harm patients by imposing higher OOP costs, some of which are more closely related to the list price but not the net price (the list price in the absence of the rebate amount) (HHS, 2019). Therefore, the HHS proposed to eliminate manufacturer rebates, hoping that the removed rebates would be applied to point-of-sale price concessions, and beneficiary cost-sharing would be reduced (HHS, 2019). The increased affordability might lead to more uses of prescription drugs and a reduction in other medical costs (Roebuck et al., 2015).

Nonetheless, some research indicates that manufacturer rebates actually benefit both payers and consumers by lowering premiums, government payments, and consumer OOP costs (Roehrig, 2018). Antos and Capretta (2019) argue that a redesign of Medicare Part D benefits might produce lower drug prices than the pharmaceutical rebate ban. Additionally, Visante (2017) and Visante (2018) show that there is no correlation between increasing drug prices and manufacturer rebates, and drug manufacturers set prices independent of rebates. More often, manufacturer rebates are applied to reduce premiums for all enrollees (HHS, 2019). The federal Centers for Medicare & Medicaid Services (CMS) (2018) states, "[u]nder the proposed rule, there would be a shift from rebates used to lower overall premiums

to chargebacks and lower prices that would reduce beneficiary OOP spending." Klaisner, Holcomb and Filipek (2019) document a unanimous premium increase under several scenarios after removing manufacturer rebates. Fitzpatrick and Carlson (2018) find that the average Medicare Part D premium would have been 45% and 52% higher in 2017 and 2018 without rebates. Furthermore, the CMS (2018) shows that the extra government costs ($196 billion for 2020–2029) for Medicare Part D due to premium increases are far more than offsetting the savings of beneficiaries ($25 billion for 2020–2029) under the proposed rule. In response, this current research aims to provide further evidence on the impact of manufacturer rebates by examining their pass-through to premiums of health insurers and delineating the premium impact of rebates using an alternative approach. In the literature, Duggan, Starc and Vabson (2016); Cabral, Geruso and Mahoney (2018); and Carey (2018) inspect the pass-through of government payments to Medicare Advantage plans. However, none of the previous studies have evaluated the pass-through of pharmaceutical manufacturer rebates to premiums.

Specifically, this current research analyzes the efficiency performance and the pharmaceutical rebate pass-through behavior of the four business lines of a sample of private health insurers offering prescription drug benefits: the comprehensive individual line, the comprehensive group line, the whole comprehensive (individual/group) line, and Medicare Advantage. For each of the four business lines, the DEA model is applied to generate the efficient prescription drug spending of every health insurer. The potential prescription drug cost savings are then determined by comparing the efficient prescription drug spending with the actual prescription drug spending. Additionally, the potential cost reductions on other medical costs are also calculated and presented: hospital/medical expenses (excluding prescription drug expenses), quality improvement expenses, claims adjustment expenses, and general administrative expenses. The pass-through of manufacturer rebates to premiums is quantified using the regression models for each of the four samples of insurers.

The results of this research indicate that eliminating pharmaceutical rebates would induce differential premium increases for different business lines of health insurance. However, the total cost reductions on hospital/medical expenses, prescription drug expenses, and other expenses through efficiency improvement are always more than enough to offset any potential premium increases. The findings of this research imply that policymakers and state insurance regulators may remove pharmaceutical rebates to reduce drug list prices and consumers' OOP costs, but simultaneously they should initiate innovative policy and regulatory changes to improve the efficiency of health insurers, reduce their expenses, and offset the potential premium increases. Alternatively, the policymakers and state insurance regulators may still keep pharmaceutical rebates in place but utilize the cost savings from efficiency improvement to reduce the consumers' OOP costs.

Regarding efficient practices, Chambers, Rane and Neumann (2016) review some empirical evaluations on closed formularies and find that most drug exclusion policies result in cost savings. Marsa (2019) presents various solutions to lower prescription drug prices, such as legalizing the importation of less expensive

prescription drugs from other countries. The HHS and the U.S. Food and Drug Administration (FDA) have developed a federal "Safe Importation Action Plan" proposing two pathways to allow for the importation of drugs from foreign countries (HHS and FDA, 2019). In this research, the DEA analysis identifies the efficient health insurers and generates the relative efficiency and efficient targets for inefficient health insurers. However, the efficient "best practices" and the corresponding regulatory efficiency improvement initiatives can only be uncovered through the follow-up "field inspections" of the efficient insurers. Delineation of specific "best practices" and their viability is beyond the scope of this research, and it should be a rich area for future research.

The remainder of the article is organized as follows. The next section presents the sample, data, DEA, and regression models. The third section offers descriptive statistics and univariate analyses. The fourth section analyzes the pass-through of manufacturer pharmaceutical rebates to premiums. The fifth section investigates the efficiency-based potential cost reductions. The final section concludes the article with a summary of the findings.

Data and Research Design

This research examines the potential cost reductions on prescription drug expenses and the pass-through of prescription drug rebates (manufacturer pharmaceutical rebates) to the premium of health insurers. The sample of this research comprises the health insurers from 2015 to 2017 that offer the prescription drug coverage. The data used in this research come from the health insurers' financial statements filed with NAIC.[1] There are six major business lines of private health insurance: comprehensive individual, comprehensive group, Medicare supplement, federal employees health benefits plan, Medicare Advantage, and Medicaid managed care. Pharmaceutical rebates have been reported by the business line of the health insurer since 2011, but Medicare Advantage was not separated until 2015. Consequently, this research uses the data of three years, starting in 2015 when pharmaceutical rebates for Medicare Advantage were reported separately, and ending in 2017 (the most recent year with data available).

The pharmaceutical rebates are reported aggregately for Medicaid managed care (Title XIX) and the Children's Health Insurance Program (CHIP) (Title XXI). As discussed later in this section, the two medical services utilization measures (ambulatory encounters and hospital patient days) are among the independent variables of the regression analysis and the input variables of the DEA models. However, they are not available for the CHIP plans separately. In addition, for Medicaid, the federal statutory Medicaid rebate under the Medicaid Drug Rebate

1. Pharmaceutical rebates come from the Supplemental Health Care Exhibit. Enrollment and the medical services utilization data come from the Exhibit of Premiums, Enrollment and Utilization.

Program and the state-negotiated supplemental rebates are collected by the states (MACPAC, 2018). Medicaid MCOs can negotiate their own rebates with manufacturers, but generally the rebates are very small. Consequently, Medicaid managed care is not included in this research. Furthermore, there are very few insurers with prescription drug and pharmaceutical rebate data for Medicare supplement, so it is also excluded from this research. In the reporting of pharmaceutical rebates, federal employees health plans are included in the comprehensive group line, thus they are not analyzed separately. Therefore, this research covers the business lines of comprehensive individual, comprehensive group[2] (including federal employees health benefits plans), and Medicare Advantage. Additionally, this research also analyzes the total comprehensive line (comprehensive individual/group), which aggregates the comprehensive individual and group lines.

The sample of the health insurers for each of the business lines is presented in Table 1.[3] There are 629 insurers in the comprehensive individual line, 792 insurers in the comprehensive group line, 933 insurers in the whole comprehensive (individual/group) line, and 527 insurers in Medicare Advantage. The two medical services utilization measurers are only applicable to Medicare Advantage plans but not Medicare Part D stand-alone prescription drug plans. Therefore, the insurers with Medicare Part D plans (12%) are excluded from the sample. That is, this research only analyzes the 527 insurers with Medicare Advantage plans but not Part D plans.

To investigate the impact of pharmaceutical rebates on the premium of health insurers, this research estimates the following regression model for each of the four business lines (comprehensive individual, comprehensive group, comprehensive individual/group, and Medicare Advantage)[4]:

$$Premium_{ist} = \alpha + \beta PharmaceuticalRebates_{ist} + \gamma X_{ist} + \eta Year_t + \delta State_s + \varepsilon$$

where $Premium_{ist}$ represents the earned premium per member year for each line of insurer *i* domiciled in state *s* at year *t*. The coefficient of interest would be β, which measures the impact of pharmaceutical rebates (*PharmaceuticalRebates*). *Year* is a

2. The group markets are classified into small group markets and large group markets. However, the medical services utilization measures are not available for the small group and large group markets separately. Therefore, the regression and DEA analysis of the small group and large group markets cannot be conducted separately.

3. The sample of this research comprises the health insurers included in the NAIC HealthPro dataset. Life insurers offering health insurance are not included in this research. In addition, some health insurers do not report to the NAIC. Therefore, the sample does not include all the health insurance business. However, it is reasonable to state that the sample is representative of the health insurance business lines considered in this research.

4. The 2SLS model is not adopted in this research due to the weak instrument issue. Crown, Henk and Vanness (2011) document a greater potential for inferential errors when using instrumental variables rather than the ordinary least squares regression models in all the scenarios, but the most ideal circumstances.

vector of year fixed effects, and *State* is a vector of state fixed effects. X_{ist} is a vector of control variables of insurer characteristics.

Table 1:
Number of insurers in the sample of the business line: comprehensive individual, comprehensive group, comprehensive individual/group, and Medicare Advantage

Insurer category		Sample of insurers with comprehensive individual	Sample of insurers with comprehensive group	Sample of insurers with comprehensive individual/group	Sample of insurers with Medicare Advantage
Group affiliation	Single insurers	68	97	113	36
	Small group insurers	406	429	537	224
	Big group insurers	155	266	283	267
Number of states the insurer serves	Single state insurers	479	587	702	390
	Multi-state insurers	150	205	231	137
Organization type[4]	Stock insurers	403	529	634	432
	Non-stock insurers	226	263	299	95
Total		629	792	933	527

To address the potential endogeneity concern of pharmaceutical rebates, state-fixed effects are incorporated to account for the factors that vary across the states, and year-fixed effects are included to capture the factors that vary over time (Karaca-Mandic, Abraham and Simon, 2015). This current research controls for a rich set of insurer characteristics including the insurer organization type, group affiliation, the number of states the insurer serves, the size of the insurer, business lines, and product types. Additionally, the utilization measures of medical services are incorporated to control for the effect of insureds' risk profiles. Different from Karaca-Mandic, Abraham and Simon (2015), the control variables also include the insurer's various payment methods, such as capitation payments and fee-for-service payments. For robustness checks and sensitivity tests, the regression analysis is also conducted on the sub-samples of insurers that remained in the market all three years of the sample time period; and another regression is conducted, including an additional explanatory variable—percentage of incurred claims paid in prescription drugs.

The description of the independent variables is presented in the Appendix (Yang, 2018). By group affiliation, the insurers are classified into three types: single insurers (unaffiliated with a group), big group insurers (affiliated with any of the top five groups: UnitedHealthcare, Anthem, Aetna, Humana and Cigna), small group insurers (other group insurers). The two group affiliation dummy variables (single insurers and big group insurers) are included in the regression models. The dummy

variable "single-state insurers" indicates whether the insurer serves only one state or more than one state. Most insurers do not use all the payment methods or operate in all the business lines, and they do not offer all the different types of plans. There is also some multicollinearity among the variables of payment methods, product types and business lines. Therefore, only some of them are included in the regression models (Yang, 2018).

The dependent variable "the earned premium[5] per member year" is the premium for the coverage of both hospital/medical expenses and prescription drug expenses of each line of the insurer, not just the premium of the prescription drug coverage. Therefore, this research examines the impact of pharmaceutical rebates on the total premium of each business line of the insurer. The independent variable of interest, "pharmaceutical rebates," is measured as the percentage of the gross prescription drug expenses before rebates. The prescription drug expenses after pharmaceutical rebates are referred to as "net prescription drug expenses" in this research. The definition of some expense variables are presented in Table 2. The pharmaceutical rebates considered in this research are those received by the private health insurer. The dollar amounts of this research are all adjusted to the 2017 Texas dollar (so they are comparable) by state average weekly wages, which are available from the U.S. Bureau of Labor Statistics at *https://www.bls.gov/* (Yang, 2014).

Table 2:
Definition of some expense variables

Variable	Definition
Net prescription drug expenses	Prescription drug expenses after pharmaceutical rebates
Gross prescription drug expenses	Prescription drug expenses before pharmaceutical rebates
Total net medical expenses	Hospital/medical expenses (including net prescription drug expenses)
Total gross medical expenses	Hospital/medical expenses (including gross prescription drug expenses)
Other expenses	Quality improvement, claims adjustment and general administrative expenses
Total net expenses	Hospital/medical expenses (including net prescription drug expenses) and other expenses
Total gross expenses	Hospital/medical expenses (including gross prescription drug expenses) and other expenses

High prescription drug prices and expenses have drawn much attention and criticism.[6] In addition to lowering prices of prescription drugs by pharmaceutical manufacturers, efficiency improvement of health insurers presents another opportunity to reduce prescription drug expenses. In this current research, DEA models are used to calculate the potential prescription drug cost reductions. The DEA model generates efficient target values for inputs and outputs. The difference

5. In this research, the earned premium refers to the net written premium, net of reinsurance but not taxes or fees. In the sample of this research, generally the reinsurance is of a negligible amount.

6. Aitken et al. (2016) discuss various underlying factors likely to influence prescription drug spending, such as strengthening of the innovation pipeline, consolidation among buyers, and reduced incidence of patent expirations.

between the actual input value and the efficient input target value is the potential cost reductions (or savings) in the input. The efficiency of health insurers can be evaluated from various perspectives, such as the insurers' perspective, the consumers' perspective and the societal perspective (Yang and Lin, 2017). Different perspectives require different inputs and outputs. One of the major objectives of any health care system (including the federal Affordable Care Act [ACA]) is to provide necessary medical services to the maximum number of beneficiaries with reasonable costs. Therefore, this current research adopts the societal perspective to measure the "medical services efficiency" of the health insurer (Brockett et al., 2004; Yang, 2014; Yang and Lin, 2017; Yang and Wen, 2017; Brockett, Golden and Yang, 2018), which evaluates the insurer's performance in minimizing medical costs given the number of covered persons and medical services received (or maximizing the number of covered persons and medical services received given medical costs). Correspondingly, the outputs are the measures of health coverage and medical services provided; and the inputs are the expenses incurred. Specifically, the outputs include enrollment and the utilization of medical services (e.g., ambulatory encounters and hospital patient days), and the inputs are hospital/medical expenses (excluding prescription drug expenses), prescription drug expenses, and other expenses (e.g., quality improvement, claims adjustment and general administrative expenses). The inputs and outputs of the medical services efficiency model are presented in Table 3.

Table 3:
Inputs and Outputs of DEA Efficiency

DEA efficiency models	Inputs	Outputs
Model 1 (net prescription drugs)	Hospital/medical expenses (excluding prescription drugs)	Member months
	Net prescription drug expenses (after rebates)	Ambulatory encounters
	Other expenses (quality improvement, claims adjustment and general administrative expenses)	Hospital patient days
Model 2 (gross prescription drugs)	Hospital/medical expenses (excluding prescription drugs)	Member months
	Gross prescription drug expenses (before rebates)	Ambulatory encounters
	Other expenses (quality improvement, claims adjustment and general administrative expenses)	Hospital patient days

Different from the studies of health insurers' cost reductions in the literature (e.g., Yang and Lin (2017) and Brockett, Golden and Yang (2018)), this current research isolates prescription drug expenses from hospital/medical expenses to analyze the potential cost reductions on prescription drug expenses specifically. The DEA Model 1 uses net prescription drugs after rebates. Because of the proposal of removing the rebates, this current research also examines the potential reductions on gross prescription drugs before rebates (DEA Model 2). DEA Model 2 is utilized

to analyze prescription drug cost reductions if the rebates are not allowed. Prohibiting rebates would have affected premiums or profit margins of health insurers, but not the "set coverage" of medical services (e.g., ambulatory encounters and hospital patient days). Insurers receive rebates after gross prescription drug expenses are incurred. DEA Model 2 actually compares the efficiency on gross prescription drug expenses given the enrollment and medical services. Therefore, the outputs are the same for both DEA Model 1 and DEA Model 2. Instead of using quality improvement, claims adjustment and general administrative expenses as separate inputs, this current research aggregates them to one input "other expenses." This aggregation results in a bigger sample of insurers because insurers with non-positive values in any of the three expenses would have to be excluded otherwise.

Descriptive Statistics and Univariate Analyses

This section presents some descriptive and univariate analyses of premiums, hospital/medical expenses, prescription drug expenses, pharmaceutical rebates, and other expenses for the comprehensive lines and Medicare Advantage. As stated, there are 629 insurers in the comprehensive individual line, 792 insurers in the comprehensive group line, 933 insurers in the whole comprehensive (individual/group) line, and 527 insurers in Medicare Advantage.

Some summary statistics of hospital/medical expenses and net prescription drug expenses are presented in Table 4. On average, hospital/medical expenses (excluding prescription drug expenses) per member year are $3,718 for the whole comprehensive line. Within the comprehensive line, hospital/medical expenses per member year of the comprehensive group line is 10% higher than that of the comprehensive individual line—$3,915.2 versus $3,558.2 (statistically significant, p-value is <0.0001). For Medicare Advantage, the average of hospital/medical expenses per member year is $9,693.6, 160.7% higher than that of the whole comprehensive line.

On average, net prescription drug expenses per member year of the whole comprehensive line are $823.3. Within the comprehensive line, net prescription drug expenses account for 20.1% and 17.5% of the total net medical expenses for the comprehensive individual and group lines, respectively. The average of net prescription drug expenses per member year of the comprehensive group line is 7.2% lower than that of the comprehensive individual line ($820.9 versus $885) (statistically significant, p-value is 0.000). For Medicare Advantage, the average of net prescription drug expenses per member year is $990.5, 20.3% higher than that of the whole comprehensive line. However, net prescription drug expenses of Medicare Advantage only account for 9.2% of its total net medical expenses, in contrast with 18.5% for the whole comprehensive line.

The summary statistics of gross prescription drug expenses and pharmaceutical rebates are presented in Table 5. The average gross prescription drug expenses per

member year is $1,003.7 for the comprehensive individual line, $952.4 for the comprehensive group line, $946.8 for the whole comprehensive line (individual/group), and $1,533.3 for Medicare Advantage. Pharmaceutical rebates of Medicare Advantage are the highest, on average $542.8 per member year, accounting for 35.4% of gross prescription drug expenses.

Table 4:
Summary statistics of hospital/medical expenses (excluding prescription drugs) and net prescription drug expenses

Business line	Hospital/medical expenses (excluding prescription drug expenses) per member year ($)*		Net prescription drug expenses per member year ($)*		Net prescription drug expenses (% of total net medical expenses)	
	Mean	StDev	Mean	StDev	Mean	StDev
Comprehensive individual	3,558.2	1,281.8	885	395.5	20.1%	6.5%
Comprehensive group	3,915.2	979.7	820.9	295	17.5%	5.5%
Comprehensive individual/group	3,718	1,116.8	823.3	320.6	18.5%	5.9%
Medicare Advantage	9,693.6	2,318.2	990.5	460.7	9.2%	3.4%

*The dollar amount is in the 2017 Texas dollar.

Table 5:
Summary statistics of gross prescription drugs (before rebates) and pharmaceutical rebates

Business line	Gross prescription drugs (before rebates) per member year ($)*		Pharmaceutical rebates per member year ($)*		Pharmaceutical rebates (% of gross prescription drugs)	
	Mean	StDev	Mean	StDev	Mean	StDev
Comprehensive individual	1,003.7	447	118.7	89.8	11.6%	6.5%
Comprehensive group	952.4	329.8	131.5	86.1	13.9%	8.3%
Comprehensive individual/group	946.8	356.8	123.5	86.8	13%	8.2%
Medicare Advantage	1,533.3	557.6	542.8	327.7	35.4%	16.7%

*The dollar amount is in the 2017 Texas dollar.

For the comprehensive line, the average pharmaceutical rebates are $123.5 per member year (accounting for 13% of gross prescription drug expenses) for the whole comprehensive line, $118.7 (11.6%) for the comprehensive individual line, and $131.5 (13.9%) for the comprehensive group line. The pharmaceutical rebates

of the comprehensive individual line are 9.7% lower than that of the comprehensive group line ($118.7 versus $131.5) (statistically significant, p-value is 0.003).

Some summary statistics of the earned premium, net prescription drug expenses, and pharmaceutical rebates (relative to earned premiums) are presented in Table 6. On average, the earned premiums per member year are $5,273.8 for the whole comprehensive line. Within the comprehensive line, the earned premium per member year of the comprehensive group line is 10.9% higher than that of the comprehensive individual line ($5,556.9 versus $5,010.4) (statistically significant, p-value is <0.0001). For Medicare Advantage, the average of hospital/medical expenses per member year is $12,329.7, 133.8% higher than that of the whole comprehensive line.

Table 6:
Summary statistics of earned premiums, net prescription drug expenses and pharmaceutical rebates (% of earned premiums)

Business line	Earned premiums per member year ($)*		Net prescription drug expenses (% of earned premiums)		Pharmaceutical rebates (% of earned premiums)	
	Mean	StDev	Mean	StDev	Mean	StDev
Comprehensive individual	5,010.4	1,670.1	17.8%	6%	2.3%	1.5%
Comprehensive group	5,556.9	1,198.3	14.8%	4.6%	2.4%	1.6%
Comprehensive individual/group	5,273.8	1,392.1	15.8%	5.2%	2.4%	1.7%
Medicare Advantage	12,329.7	3,047	8.1%	3.4%	4.4%	2.3%

*The dollar amount is in the 2017 Texas dollar.

Net prescription drug expenses of the whole comprehensive line account for 15.8% of earned premiums, but only 8.1% for Medicare Advantage. The net prescription drug expenses are 17.8% of the earned premium for the comprehensive individual line, significantly higher than that of the comprehensive group line (14.8%) (p-value is <0.0001). Regarding pharmaceutical rebates, they account for 4.4% of the earned premium for Medicare Advantage. Pharmaceutical rebates account for 2.4% of the earned premium for the whole comprehensive line, and 2.3% and 2.4% for the comprehensive individual and group lines, respectively, which are not significantly different (p-value is 0.475).

Other expenses (quality improvement, claims adjustment and general administrative expenses) are one of the inputs of the DEA analysis of this research. Some summary statistics of other expenses are presented in Table 7. On average, other expenses for Medicare Advantage are $1,631.8 per member year, 147.9% higher than that of the whole comprehensive line ($658.2). Other expenses per member year of the comprehensive individual line are 4.8% higher than that of the comprehensive group line ($686.3 versus $655.1) (statistically significant, p-value is 0.02).

Table 7:
Summary statistics of other expenses (quality improvement, claims adjustment and general administrative expenses

Business line	Other expenses per member year ($)*		Other expenses (% of total net expenses)	
	Mean	StDev	Mean	StDev
Comprehensive individual	686.3	289.7	14%	5.4%
Comprehensive group	655.1	280.2	12.4%	5.3%
Comprehensive individual/group	658.2	274.7	13.1%	5.6%
Medicare Advantage	1,631.8	634.1	13.3%	4.2%

*The dollar amount is in the 2017 Texas dollar.

Relative to the total net expenses (hospital/medical expenses, net prescription drug expenses, and other expenses), other expenses account for 13.1% and 13.3% of the total net expenses for the whole comprehensive line and Medicare Advantage. Other expenses account for 14% of the total net expenses for the comprehensive individual line, significantly higher than that of the comprehensive group line (12.4%) (p-value is <0.0001).

Pass-Through of Pharmaceutical Rebates to Premiums

To investigate the impact of pharmaceutical rebates on premiums, this research conducts a series of regression analyses for the four samples of insurers with the comprehensive individual line, the comprehensive group line, the whole comprehensive (individual/group) line, and Medicare Advantage, respectively. The independent variables with very few values are excluded, such as provider service organization (PSO) plans and bonus/withhold – fee-for-services. Additionally, due to the multicollinearity issue, the variables with the variance inflation factor (VIF) bigger than 5 are also excluded, such as contractual fee payments. The regression estimates of the impact of pharmaceutical rebates on the earned premium of each business line are presented in Table 8.[7,8]

7. For robustness checks, the regression and DEA analyses are also conducted on the sub-samples of insurers that remained in the market all three years of the sample time period. Similar results are obtained, so they are not presented in this research. For example, for the sub-samples (459 individual insurers, 672 group insurers, 783 individual/group insurers, and 396 Medicare insurers), the premium increases per member year with a one percentage point decrease in pharmaceutical rebates are $7.3 (individual line), $26.7 (group line), $14.8 (individual/group line) and $14.40 (Medicare Advantage). For the whole sample, the premium increases are $7 (individual line), $24.7 (group line), $15.8 (individual/group line), and $12.9 (Medicare Advantage).

8. For another robustness check and to address the potential endogeneity issue, the regression analysis is also conducted, including an additional explanatory variable, a percentage of incurred

Table 8:
Regression estimates of the effect of pharmaceutical rebates (% of gross prescription drug expenses on earned premiums (per member year)

Variables	Earned premiums (comprehensive individual)	Earned premiums (comprehensive group)	Earned premiums (comprehensive individual/group)	Earned premiums (Medicare Advantage)
Pharmaceutical rebates	-698.83	-2473.69***	-1584.19***	-1292.74*
Size of the insurer	-116.58	12.90	-36.75	738.09***
Big group insurers	81.71	340.08***	296.53***	923.68***
Single insurers	-76.35	-208.54*	-89.62	1696.82***
Single-state insurers	-55.68	177.71*	55.39	437.77*
Stock insurers	-289.10*	-27.32	-259.87***	632.87**
Ambulatory encounters per member year	47.65***	22.80***	23.92***	37.69***
Hospital patient days per member year	318.80	751.85***	311.20	489.56***
Enrollment in the comprehensive individual line		-407.70**	-969.46***	-851.24
Enrollment in the comprehensive group line	1215.53***			-1150.63**
Enrollment in Medicare supplement	526.63	1582.81***	-1.00	2715.64
Enrollment in Federal Employees Health Benefits (FEHB) plans	1120.91	496.93	592.10	1886.41
Enrollment in Medicare Advantage	1022.50**	457.75**	114.33	
Enrollment in Medicaid managed care	167.21	322.98	-1137.59***	1916.46***
Health maintenance organizations (HMOs)				916.02**
Preferred provider organizations (PPOs)	843.93***	335.08***	300.26**	420.59
Point of service (POS)	-446.84	-523.02***	-751.71***	-936.67
Indemnity only	-484.64	81.87	-167.96	-846.38
Capitation payments	522.61	317.97	154.09	1592.49***
Fee-for-service payments	-613.95**	21.95	-217.25	1334.57***
Bonus/withhold - contractual fee payments	709.17	639.73**	480.69	337.36
Non-contingent salaries	-848.46	1012.75	962.95	4585.36*
Aggregate cost arrangements	-2477.11*	-0.89	-654.07	1885.84
Observations	629	792	933	527
R^2	0.49	0.47	0.45	0.66
Adjusted R^2	0.42	0.41	0.41	0.62

Other variables included: year and state dummy variables.
***p<0.01, **p<0.05, *p<0.10.

CMS (2018) examines the impacts of removing pharmaceutical rebates and assumes that 15% of the eliminated rebates would be retained by manufacturers,

claims paid in prescription drugs. Similar results are obtained. The premium increases per member year with a one percentage point decrease in pharmaceutical rebates are $5.8 (individual line), $29 (group line), $18.1 (individual/group line) and $13 (Medicare Advantage). For the whole sample, the premium increases are $7 (individual line), $24.7 (group line), $15.8 (individual/group line) and $12.9 (Medicare Advantage).

75% of the remaining 85% would be converted into chargebacks, and 25% of the remaining 85% (that is, 21% of the eliminated rebates) would be used to lower list prices of prescription drugs. This current research presents the results of four scenarios: none of the eliminated rebates are used to lower list prices (all are retained by manufacturers and/or applied to chargebacks), 25% of the eliminated rebates are used to lower list prices, 50% of the eliminated rebates are used to lower list prices, and 75% of the eliminated rebates are used to lower list prices.

For **the whole comprehensive (individual/group) line**, the regression results indicate that the earned premium per member year increases by $15.8 with a one percentage point decrease in pharmaceutical rebates. On average, pharmaceutical rebates account for 13% of gross prescription drug expenses for the whole comprehensive line (Table 5). If the pharmaceutical rebates are all eliminated but the prescription drug list price is not lowered, the premium of the whole comprehensive line would increase by $205.4 per member year ($1,584 x 13%), or $17.1 per member month. From the insurer's side, using 25% of the eliminated rebates to lower list prices is equivalent to eliminating 75% of the rebates. Therefore, if 25% of the eliminated rebates are used to lower list prices, the premium of the whole comprehensive line would increase by $154.1 per member year ($1,584 x 13% x 75%), or $12.8 per member month. Similarly, if 50% of the eliminated rebates are used to lower list prices, the premium of the whole comprehensive line would increase by $102.7 per member year ($1,584 x 13% x 50%), or $8.6 per member month. If 75% of the eliminated rebates are used to lower list prices, the premium of the whole comprehensive line would increase by $51.4 per member year ($1,584 x 13% x 25%), or $4.3 per member month.

For **the comprehensive individual line**, the regression results indicate that the earned premium per member year increases by $7 with a one percentage point decrease in pharmaceutical rebates. On average, pharmaceutical rebates account for 11.6% of gross prescription drug expenses for the comprehensive individual line (Table 5). If the pharmaceutical rebates are all eliminated but the prescription drug list prices are not lowered, the premium of the comprehensive individual line would increase by $81.1 per member year, or $6.8 per member month. If 25% of the eliminated rebates are used to lower list prices, the premium of the comprehensive individual line would increase by $60.8 per member year, or $5.1 per member month. If 50% of the eliminated rebates are used to lower list prices, the premium of the comprehensive individual line would increase by $40.5 per member year, or $3.4 per member month. If 75% of the eliminated rebates are used to lower list prices, the premium of the comprehensive individual line would increase by $20.3 per member year, or $1.7 per member month.

For **the comprehensive group line**, the regression results indicate that the earned premium per member year increases by $24.7 with a one percentage point decrease in pharmaceutical rebates. On average, pharmaceutical rebates account for 13.9% of gross prescription drug expenses for the comprehensive group line (Table 5). If the pharmaceutical rebates are all eliminated but the prescription drug list price is not lowered, the premium of the comprehensive group line would increase by $343.8 per member year, or $28.7 per member month. If 25% of the eliminated

rebates are used to lower list prices, the premium of the comprehensive group line would increase by $257.9 per member year, or $21.5 per member month. If 50% of the eliminated rebates are used to lower list prices, the premium of the comprehensive group line would increase by $171.9 per member year, or $14.3 per member month. If 75% of the eliminated rebates are used to lower list prices, the premium of the comprehensive group line would increase by $86 per member year, or $7.2 per member month.

For **Medicare Advantage**, the regression results indicate that the earned premium per member year increases by $12.9 with a one percentage point decrease in pharmaceutical rebates. On average, pharmaceutical rebates account for 35.4% of gross prescription drug expenses for Medicare Advantage (Table 5). If the pharmaceutical rebates are all eliminated but the prescription drug list price is not lowered, the premium of Medicare Advantage would increase by $457.6 per member year, or $38.1 per member month. If 25% of the eliminated rebates are used to lower list prices, the premium of Medicare Advantage would increase by $343.2 per member year, or $28.6 per member month. If 50% of the eliminated rebates are used to lower list prices, the premium of Medicare Advantage would increase by $228.8 per member year, or $19.1 per member month. If 75% of the eliminated rebates are used to lower list prices, the premium of Medicare Advantage would increase by $114.4 per member year, or $9.5 per member month.

The premium increases of applying differential amounts of eliminated rebates to lower prescription drug list prices are summarized in Table 9. The potential premium increase of eliminating pharmaceutical rebates is the highest for Medicare Advantage, 122.2% more than that of the whole comprehensive (individual/group) line ($19.1 versus $8.6 per member month if 50% of eliminated rebates are used to lower list prices). The potential premium increase of eliminating pharmaceutical rebates is very small for the comprehensive individual line, only $3.4 per member month if 50% of eliminated rebates are used to lower list prices.

Table 9:
Premium increases (per member month) with differential applications of eliminated rebates to lower list prices

Business line	0% of eliminated rebates are used to lower list prices	25% of eliminated rebates are used to lower list prices	50% of eliminated rebates are used to lower list prices	75% of eliminated rebates are used to lower list prices
Comprehensive individual	$6.8	$5.1	$3.4	$1.7
Comprehensive group	$28.7	$21.5	$14.3	$7.2
Comprehensive individual/group	$17.2	$12.9	$8.6	$4.3
Medicare Advantage	$38.1	$28.6	$19.1	$9.5

Efficiency-Based Potential Cost Reductions

Reducing health expenditures (including prescription drug expenses) is a shared responsibility among all the stakeholders. Besides the attempts to lower prescription drugs prices by pharmaceutical manufacturers, insurers should also try to reduce prescription drug expenses through efficiency improvement. Using the DEA efficiency models, this section examines the potential cost reductions on prescription drug expenses; hospital/medical expenses; and other expenses, including quality improvement, claims adjustment and general administrative expenses. Specifically, the input-oriented constant returns-to-scale (CRS) DEA model is adopted in this research to obtain DEA efficiency scores and efficient inputs (Brockett, Golden and Yang, 2018). The difference between the actual input value and the efficient input target value is the potential cost reductions (or savings) in the input.

The DEA optimization problems are solved by using the DEA software developed by Joe Zhu (Zhu, 2009). Similar to Yang and Wen (2017), it is not realistic to expect the insurers to be the most efficient in the whole sample. Therefore, the median efficiency of each sample is selected as the efficiency goal for less efficient insurers. Firstly, the DEA model is run on all the insurers of each line to get their efficiency scores. The DEA model is then applied to the insurers at or below the median efficiency to obtain the efficient input target values and hence the potential cost reductions. The insurers above the median efficiency are unnecessary to reduce costs/expenses. For example, to get the potential cost reductions for Medicare Advantage, firstly the DEA model is run on the 527 Medicare Advantage insurers. The median efficiency of the 527 Medicare Advantage insurers is 0.6846. The DEA model is then applied to the 264 Medicare Advantage insurers with an efficiency score at or below 0.6846 to obtain their efficient inputs.

This research analyzes the potential cost reductions on both net prescription drug expenses and gross prescription drug expenses. The potential cost savings using DEA Model 1 (with net prescription drug expenses as one of the inputs) are presented in Table 10. Using the median efficiency as the goal, the potential cost savings on net prescription drug expenses are $6.5 per member month for the whole comprehensive (individual/group) line, $8.5 for the comprehensive individual line, $6.2 for the comprehensive group line, and $8.5 for Medicare Advantage. These potential cost reductions on prescription drug expenses are enough to offset the potential premium increases from eliminating pharmaceutical rebates for the comprehensive individual line. However, they may not be sufficient for the whole comprehensive line, the comprehensive group line, or Medicare Advantage, depending on the amount of the eliminated rebates being used to lower prescription drug list prices. For example, if 50% of the eliminated rebates are used to lower list prices, the potential premium increases of Medicare Advantage are $19.1 per member month (Table 9), while the potential cost reductions on prescription drug expenses are only $8.5 per member month.

Table 10:
Potential cost reductions on hospital/medical expenses, net prescription drug expenses (after rebates), and other expenses

Business line		Hospital and medical expenses (excluding prescription drugs)		Net prescription drug expenses		Quality improvement, claims adjustment and general administrative expenses	
		$ per member month	% of earned premiums	$ per member month	% of earned premiums	$ per member month	% of earned premiums
Comprehensive individual	Mean	32.7	6.1%	8.5	1.6%	6.9	1.4%
	StDev	57.6	10.2%	15.7	2.7%	13.8	3.6%
Comprehensive group	Mean	27.1	5.3%	6.2	1.2%	5.8	1.2%
	StDev	44	8.2%	10.7	2.1%	11.5	2.3%
Comprehensive individual/group	Mean	27.6	5.4%	6.5	1.3%	5.9	1.2%
	StDev	47.3	9%	12.6	2.2%	11.5	2.3%
Medicare Advantage	Mean	56.2	4.2%	8.5	0.7%	12.1	1%
	StDev	122	7.7%	21.5	1.7%	28.5	2.4%

Nonetheless, the total cost reductions on hospital/medical expenses, prescription drug expenses, and other expenses (quality improvement, claims adjustment and general administrative expenses) are always more than enough to offset any potential premium increases for all the business lines, no matter how much of the eliminated rebates are used to lower prescription drug list prices. Specifically, the total potential cost reductions based on the median efficiency objective are $40 per member month for the whole comprehensive (individual/group) line, $48.1 for the comprehensive individual line, $39.1 for the comprehensive group line, and $76.8 for Medicare Advantage, in contrast with the respective potential premium increases of $17.2 (whole comprehensive line), $6.8 (comprehensive individual line), $28.7 (comprehensive group line) and $38.1 (Medicare Advantage) when none of the eliminated rebates are used to lower prescription drug list prices (Table 9).

Insurers receive pharmaceutical rebates after gross prescription drug expenses are incurred. Therefore, it is reasonable to also evaluate the potential cost reductions on gross prescription drug expenses, which actually apply to "the scenario when none of the eliminated rebates are used to lower prescription drug list prices." The potential cost savings using DEA Model 2 (with gross prescription drug expenses as one of the inputs) are presented in Table 11. The results show that based on the median efficiency goal, the potential cost reductions on gross prescription drug expenses are $7.1 per member month for the whole comprehensive (individual/group) line, $9.6 for the comprehensive individual line, $6.7 for the comprehensive group line, and $11.1 for Medicare Advantage, in contrast with the respective cost reductions on net prescription drug expenses of $6.5 (whole comprehensive line), $8.5 (comprehensive individual line), $6.2 (comprehensive group line), and $8.5 (Medicare Advantage). The potential cost reductions on hospital/medical expenses and other expenses are almost the same under the two DEA models.

Table 11:
Cost reductions of hospital and medical expenses, gross prescription drug expenses (before rebates), and other expenses

Business line		Hospital and medical expenses (excluding prescription drugs)		Gross prescription drug expenses		Quality improvement, claims adjustment and general administrative expenses	
		$ per member month	% of earned premiums	$ per member month	% of earned premiums	$ per member month	% of earned premiums
Comprehensive individual	Mean	34.1	6.4%	9.6	1.8%	6.8	1.4%
	StDev	58.5	10.4%	17.3	2.9%	13.4	3.5%
Comprehensive group	Mean	27.1	5.3%	6.7	1.3%	5.9	1.2%
	StDev	43.8	8.2%	11	2.1%	11.7	2.3%
Comprehensive individual/group	Mean	27.2	5.4%	7.1	1.4%	5.9	1.2%
	StDev	46.6	8.9%	13	2.3%	11.5	2.3%
Medicare Advantage	Mean	54.3	4.2%	11.1	0.9%	12.7	1%
	StDev	106.5	7.1%	24.2	1.8%	28.8	2.4%

Conclusion

High prescription drug costs are a persistent issue with consumers and policymakers. One of the top priorities of the Trump Administration is to reduce the price of prescription drugs. The "American Patients First" blueprint of the HHS introduces a comprehensive plan to lower drug prices and reduce OOP costs. Furthermore, the HHS issued a proposed rule to eliminate manufacturer rebates to plan sponsors under Medicare Part D and Medicaid MCOs. Even though the proposed rule was withdrawn, it raised the question of how pharmaceutical rebates affect all the stakeholders, and it also drew more attention to necessitated regulatory reforms to reduce prescription drug expenses. This research investigates the pass-through of manufacturer pharmaceutical rebates to premiums, examines the potential cost reductions on prescription drug expenses through efficiency improvement, and aims to inform the public and provide insights to all the stakeholders on the treatment of manufacturer pharmaceutical rebates and prescription drug cost savings.

The descriptive analyses show that net prescription drug expenses per member year of the comprehensive group line are significantly lower than that of the comprehensive individual line. The net prescription drug expenses per member year of Medicare Advantage are higher in the dollar amount than the comprehensive lines; however, they account for the smallest percentage of the total medical expenses (9.2%) or the total premium (8.1%) (18.5% and 15.8% for the whole comprehensive line). The average pharmaceutical rebates account for 13% of gross prescription drug expenses and 2.4% of the total premium for the whole comprehensive line. Pharmaceutical rebates of Medicare Advantage are much higher, accounting for 35.4% of gross prescription drug expenses and 4.4% of the

total premium. The pharmaceutical rebates of the comprehensive individual line are significantly lower than that of the comprehensive group line.

The regression results indicate that the premium per member month increases by $1.3 with a one percentage point decrease in pharmaceutical rebates (as a percentage of gross prescription drug expenses) for the whole comprehensive line, and $1.1 for Medicare Advantage. The potential premium increase of eliminating pharmaceutical rebates is the highest for Medicare Advantage, 122% more than that of the whole comprehensive line. Specifically, by eliminating all pharmaceutical rebates but using 50% of the eliminated rebates to lower prescription drug list prices, the premium per member month would increase by $8.6 for the whole comprehensive line, and $19.1 for Medicare Advantage.

Using the median efficiency as the efficiency goal, the potential cost savings on net prescription drug expenses are $6.50 per member month for the whole comprehensive line, and $8.5 for Medicare Advantage. These potential cost reductions on prescription drug expenses may not be sufficient to offset the potential premium increases from eliminating pharmaceutical rebates for the whole comprehensive line or Medicare Advantage, depending on the amount of the eliminated rebates being used to lower prescription drug list prices. Nonetheless, the total cost reductions on hospital/medical expenses, prescription drug expenses, and other expenses (quality improvement, claims adjustment and general administrative expenses) are always more than enough to offset any potential premium increases for all the business lines, no matter how much of the eliminated rebates are used to lower prescription drug list prices. Specifically, the total potential cost reductions based on the median efficiency objective are $40 per member month for the whole comprehensive line, and $76.8 for Medicare Advantage, in contrast with the respective potential premium increases of $17.2 (whole comprehensive line), and $38.1 (Medicare Advantage) when none of the eliminated rebates are used to lower prescription drug list prices.

The findings of this research imply that policymakers and state insurance regulators may remove pharmaceutical rebates to reduce list drug prices and consumers' OOP costs, but simultaneously they should initiate innovative policy and regulatory changes to improve the efficiency of health insurers, reduce their expenses, and offset the potential premium increases. Alternatively, the policymakers and state insurance regulators may still keep pharmaceutical rebates in place but utilize the cost savings from efficiency improvement to reduce the consumers' OOP costs.

Appendix:
Description of Independent Variables

Variables		Description
Pharmaceutical rebates		Pharmaceutical rebates (% of gross prescription drug expenses)
Size of the insurer		Logarithm of member months
Big group insurers		Dummy, 1 for insurers affiliated with the top 5 groups and 0 for others
Single insurers		Dummy, 1 for unaffiliated insurers and 0 for others
Stock insurers		Dummy, 1 for stock insurers and 0 for others
Single-state insurers		Dummy, 1 for single-state insurers and 0 for others
Ambulatory encounters		Ambulatory encounters per member year
Hospital patient days		Hospital patient days per member year
Payment methods	Capitation payments	Capitation payments (% of total payments)
	Contractual fee payments	Contractual fee payments (% of total payments)
	Fee-for-service payments	Fee-for-service payments (% of total payments)
	Bonus/withhold – fee-for-service	Bonus/withhold – fee-for-service-payments (% of total payments)
	Bonus/withhold – contractual fee payments	Bonus/withhold – contractual fee payments (% of total payments)
	Non-contingent salaries	Non-contingent salaries (% of total payments)
	Aggregate cost arrangements	Aggregate cost arrangements (% of total payments)
Product types	Health maintenance organizations (HMOs)	HMO enrollment (% of total enrollment)
	Provider service organizations (PSOs)	PSO enrollment (% of total enrollment)
	Preferred provider organizations (PPOs)	PPO enrollment (% of total enrollment)
	Point of service (POS)	POS enrollment as % of total enrollment
	Indemnity only	Indemnity enrollment (% of total enrollment)
Business lines	Enrollment in the comprehensive individual line	Comprehensive (individual) enrollment (% of total enrollment)
	Enrollment in the comprehensive group line	Comprehensive (group) enrollment (% of total enrollment)
	Enrollment in Medicare supplement	Medicare supplement enrollment (% of total enrollment)
	Enrollment in Federal Employees Health Benefits (FEHB) plans	FEHB plan enrollment (% of total enrollment)
	Enrollment in Medicare Advantage	Medicare Advantage enrollment (% of total enrollment)
	Enrollment in Medicaid managed care	Medicaid managed care enrollment (% of total enrollment)
Year (Y2015, Y2016, Y2017)		Year dummy variables, year 2015 is the reference year
State		State dummy variables

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