EVALUATION OF DATABASES FOR DRUG RISK ADJUSTMENT: GEOGRAPHIC VARIATION IN PRESCRIPTION DRUG PRICES AND SPENDING

Introduction and Background

The new prescription drug benefit created by the MMA will be administered through private prescription drug plans (PDPs), which will collect both premiums from beneficiaries and payments from the Medicare program. The legislation requires the Secretary to examine the need for adjusting payments to plans based on evidence of geographic variation in prices and spending. The law calls for an adjustment for price differences, if applicable, in the first year of the benefit, while calling for a look at adjustment for utilization differences, if appropriate, at a later date. The logic behind these potential adjustments is to protect beneficiaries from paying different amounts for drug coverage based simply on where they live. Beneficiaries enrolling in Part D will pay the full difference between their plan's standardized bid and the national average standardized bid. As a result, if a plan bases its premium for a PDP region on local spending, beneficiaries in different regions may pay different prices for the same benefit delivered with the same level of efficiency.

In this paper, we analyze the extent of geographic variation in drug spending and prices. We found substantial geographic variation in drug spending, even after accounting for casemix as measured by the risk adjuster. Analysis of projected Part D premiums shows that enrollees in about half the states might face premiums of at least 10 percent above or below the national average. An initial look at actual Part D premiums for the first year suggests that geographic differences are at least that large, though an important source of variation appears to be market factors such as varying levels of competition with Medicare Advantage plans. By contrast, in our analysis of geographic variation of prices, there was little state or regional variation in either retail prices for prescriptions purchased with third-party insurance, with the exception of three outliers. Similarly, there was very little variation in the acquisition prices paid by pharmacies.

We also explore some other possible explanatory factors for variations in spending. Health status factors are associated with some of the observed spending variation, suggesting future improvements to the risk adjustment system could address some geographic differences. Supply factors such as HMO penetration and physicians per capita are also associated with differences in spending patterns. It is less clear whether adjustments should be made to account for differences resulting from supply factors or whether the market should be allowed to respond to these differences.

Geographic Variation in Drug Spending

We used claims data for Medicare beneficiaries age 65 and over included in Blue Cross/Blue Shield's Federal Employee Plan (FEP) to analyze beneficiary spending on all prescription drugs by state for 2002. The single benefit design in this database eliminates a potential source of variation that frequently occurs in other databases. We looked at actual spending in FEP, projected spending under Part D, risk adjusted spending, and the resulting beneficiary premiums. While risk adjustment tempers some of the differences, all measures show substantial variation among states.

Unadjusted FEP plan spending (2002) includes the amounts paid by the plan but excludes enrollee cost sharing, as provided on the original FEP file. FEP spending ranged from $1,441 per person in North Dakota (18% below the national average) to $2,034 per person in Indiana (15% above the national average) in 2002.

Projected plan spending (2006) includes only the estimated payments a plan would make under the Part D benefit, taking into account the impact of the deductible, initial coverage period, coverage gap, catastrophic coverage, and overhead expenses. This measure is inflated to reflect projected 2006 prices. Because the coverage gap results in less plan spending for high-spending individuals, the benefit design results in less geographic variation: we project that plan spending would range from $1,362 in Alaska (16% below the national average) to $1,724 in Indiana (7% above the national average).

Risk-adjusted projected plan spending adjusts the projected spending measure to account for the case mix of the enrollees in each state, as measured by the CMS risk-adjustment model (January 2005 version). After risk adjustment, projected plan spending ranges from $1,434 in New York (11% below the national average) to $1,739 in Indiana (8% above the national average). The risk adjuster reduces geographic variation, but a substantial amount of variation remains. In general, high-cost and low-cost states tend to remain high-cost or low-cost after risk adjustment. There are regional patterns to this variation, both before and after risk adjustment. States in the southeast and mid-Atlantic tend to have spending above the national median, while states in the northeast and the west tend to have spending below the national median.

We also estimated *projected beneficiary premiums* for each state, based on the formula specified in law. For the standard benefit, enrollees must pay a base national premium plus the difference between their plan's bid and the nationwide average of bids. We used risk-adjusted plan spending as a proxy for the bid of a plan in a given state, and risk-adjusted national spending as a proxy for the nationwide average. The variation in the projected beneficiary premiums is greater than for any of the other spending measures; beneficiaries in the most expensive state (Indiana) would pay 81 percent more than beneficiaries in the least expensive state (New York). According to this analysis, plan enrollees in about half the states would pay premiums that are at least 10 percent above or below the average of the 50 states. At the extremes, enrollees in seven states would face premiums that are at least 20 percent higher or lower than the average.

The law's intent is that beneficiaries should be required to pay more for a more expensive, less efficient plan and less for a cheaper, more efficient plan. But if it turns out that geographic variation remains after risk adjusters are applied (as in our data), then beneficiaries in more expensive states pay the entire cost of the unexplained difference between their state and the national average. Similarly, beneficiaries in low-spending states will see lower premiums than the national average simply because people in their state have lower average drug spending.

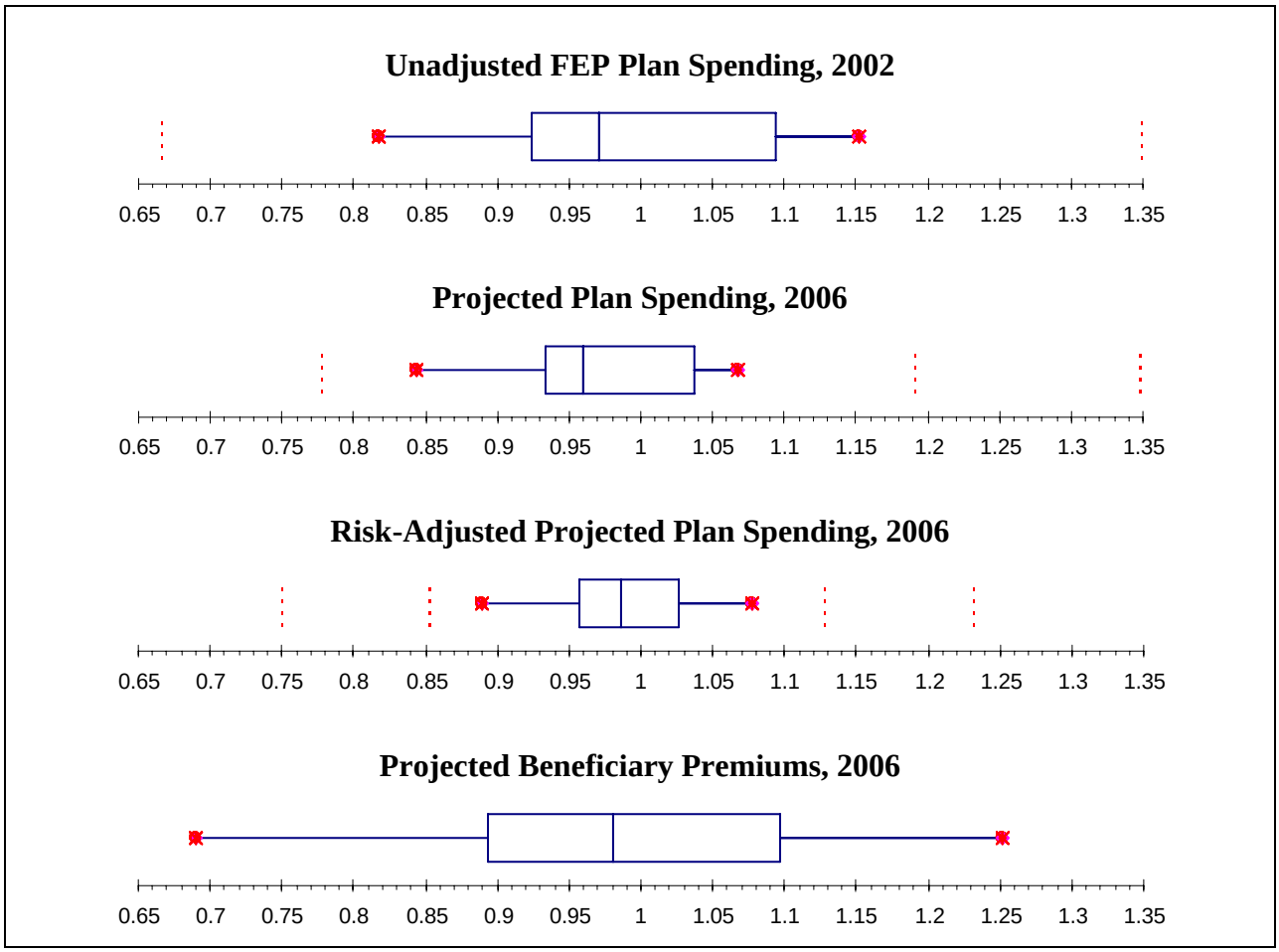
The variation in these four measures is summarized in Figure 1. In this table, we show two ratios, one of the third quartile value to the first quartile and one of the maximum value to the minimum. Because the latter can be skewed by a single small or large value, more emphasis should be given to the former measure. Figure 2 provides plots of the variation, with values displayed as percentages of the average of each measure. In each plot, the center line represents the median of the distribution of all states. The box surrounding the median represents the central 50 percent of states – the

interquartile range. The lines extending to the left of the box represent the lowest and highest quartile of states.

Figure 1. Geographic Variation in Spending and Premiums

	Interquartile Range (Ratio of Quartile 3 to Quartile 1)	Range (Ratio of Maximum to Minimum)
Unadjusted FEP Plan Spending, 2002, by State	1.18	1.41
Projected Plan Spending, 2006, by State	1.11	1.27
Risk-Adjusted Plan Spending, 2006, by State	1.07	1.21
Beneficiary Premium, 2006, by State	1.23	1.81

Figure 2. Plots of Geographic Variation in Spending and Premiums



Our findings are consistent with several other studies finding substantial spending variation at the state level.[1] However, state-level spending measures from different sources do not always show the same patterns of variation from state to state. Because the data in this report are based on spending in a single retiree health plan, this analysis is more useful for explaining general patterns than for identifying specific states that are likely to have higher or lower premiums. For example, it could be that federal retirees living in Indiana share particular characteristics that drive their costs higher, while federal retirees living in New York lack those characteristics. It is possible that spending patterns for all Medicare beneficiaries vary less by geography than do federal retirees, but it is more likely that different states could fall at the extremes of the distribution.

Geographic Variation in Retail Prices

Variation in spending can be due to variation in price and/or utilization. To determine the extent of geographic price variation, we examined data from IMS Health's National Prescription Audit™ (NPA™) database for a market basket of 62 drugs (52 brand and 10 generic) commonly used by Medicare beneficiaries.[2] We found little evidence that the geographic variation in spending is due to variation in drug prices.

With a few notable exceptions, we found little variation among most states in the price for customers that have a third-party insurance payment when they fill a prescription. Only three locations are more than 2 percent away from the average price for all states: North Dakota (3 percent above the average), Hawaii (5 percent above the average), and Puerto Rico (10 percent above the average). [3]

Using the IMS Health National Sales Prespectives™ database, we also examined the pharmacy acquisition costs for the drugs in our market basket. Observations in this analysis were combined into the ten HHS Regions because of a smaller sample size. The range of variation in acquisition prices is even lower – no region was more than one percent above or below the average. However, consolidating states into regions may be masking some variation that exists at the state level.

Figures 3 and 4 show measures of the variation in retail prices and acquisition prices that are comparable to the measures of variation in spending in the previous section. The range of variation is notably smaller for both retail and acquisition prices.

Figure 3. Geographic Variation in Retail Price and Pharmacy Acquisition Price

	Interquartile Range (Ratio of Quartile 3 to	Range (Ratio of Maximum to

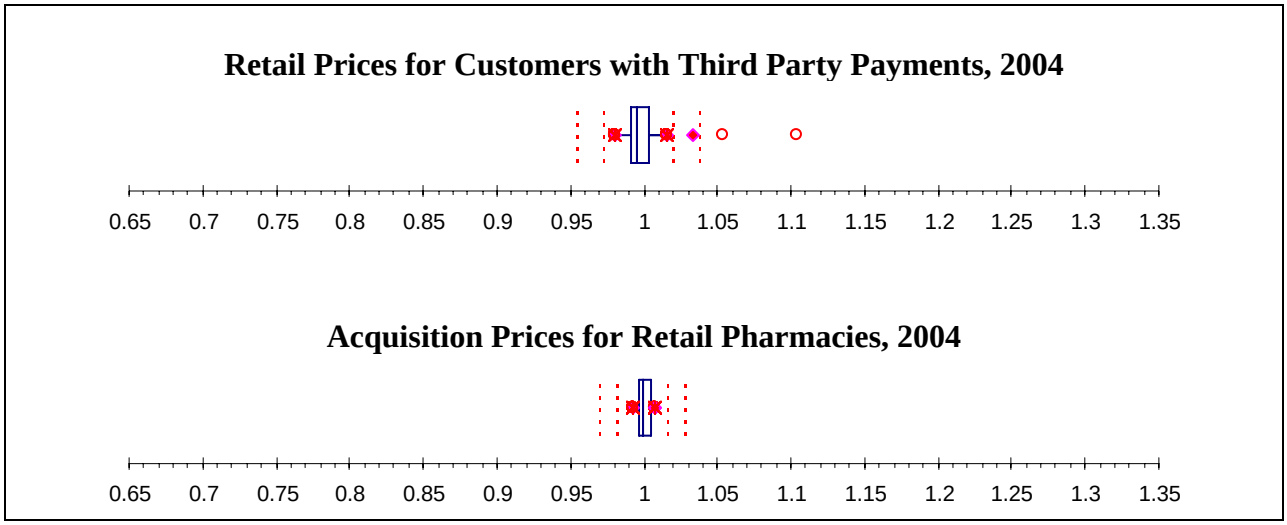
[1] Motheral, Brenda, et. al, January 2002. Express Scripts Prescription Drug Atlas; Medco Health, Drug Trend Report 6(1), May 2004; Dubois, Robert, Elaine Batchlor, and Sally Wade, 2002. "Geographic Variation in the Use of Medications: Is Uniformity Good News or Bad?" Health Affairs Volume 21, Number 1, pp. 240-249.

[2] We looked at prices for the most common form and strength of each drug during the three-months ending June 2004.

[3] Although it is less relevant to Part D, we note that for cash customers, there is more variation. Half the states are at least 3 percent away from the median of all states. Montana, the lowest-priced state for these purchasers, is 7 percent below the average of all states. Prices in Delaware and Puerto Rico are 12 and 16 percent above the average, respectively.

	Quartile 1)	Minimum)
Retail Prices, Third-Party Customers, by State	1.01	1.12
Acquisition Prices, Retail Pharmacies, by Region	1.01	1.02

Figure 4. Plots of Variation in Retail Price and Pharmacy Acquisition Price



As might be expected, the prices for each individual drug show more variation from state to state than do prices for the market basket as a whole. In particular, the prices for generic drugs are much more variable. While the range in prices for a brand-name drug tends to be no more than 20 percent of the average, the range for generic drugs can be more than 100 percent of the average. That is, the difference between the price in the highest-cost state and the lowest-cost state can sometimes be more than the average price of the drug. However, prices for these generic drugs are typically less than 50 cents per pill, while prices for the brand name drugs are often much higher.

The prices of brand-name drugs tend to be highly correlated with each other as they vary from state to state. If brand drug A is more expensive than the national average in a particular state, other brand name drugs also tend to be more expensive in that state. In contrast, the prices of generic drugs do not show any notable correlation with brand name drugs or with each other. States may have a median price far below the national average for one generic drug, and far above the national average for another drug.

Despite the minimal differences in retail prices identified in this analysis, we considered whether any factors explained the small differences. Specifically, we looked for differences between the states with the highest retail prices and those with the lowest retail prices. Input costs faced by pharmacies were one of the few factors consistently explaining price differences. There are highly significant differences between the two groups of states in the types of pharmacies that make up their markets. Low-price states have fewer independent pharmacies (26% vs. 47%) and more chain and supermarket pharmacies. The percentage of pharmacies that are chain or independent is correlated with the percentage of people living in a metropolitan area; states with a more metropolitan population are more likely to have chain pharmacies (r=.57) and less likely to have independent

pharmacies (r=-.59). This remained true after controlling for other factors such as rents and pharmacist wages, as well as other demographic factors about the state. After controlling for other factors, higher property rents were also a factor associated with higher drug prices.

Other Explanatory Factors for Spending Differences

We tested a wide range of other possible explanatory variables for the variations in projected plan spending, both before and after risk adjustment. For each, we compared the mean of each variable in the top 15 states in spending to the mean in the bottom 15 states. Results are shown in Figure 5.

The goal of the risk adjuster is to account for differences in health status and adjust plan premiums accordingly. However, our analysis shows that at the state level, significant differences in health status remain between low-spending and high-spending states after risk adjustment both before and after the risk adjuster is applied. High-spending states have a higher proportion of the population with diabetes and hypertension, a higher proportion of the population that smokes, fewer people who report good or better health status, and more people who report having limitations because of physical, mental, or emotional problems.

We also tested the proportion of each state's Medicare population that is under 65 and over 85. Both were highly significant before and after risk adjustment. High-spending states have significantly more Medicare enrollees under age 65, a factor that is negatively correlated with self-reported health status (r=-.70). At the same time, high-spending states have significantly fewer Medicare enrollees over age 85. This factor is positively correlated with health status (r=.46); it may be that people in low-spending areas are generally healthier, leading to both less prescription drug use and longer life.

After risk adjustment, high-spending states had a significantly lower HMO penetration rate (14% vs. 24%). This finding is interesting, because our data did not include HMO enrollees. It seems to imply that practice patterns may vary based on HMO presence, regardless of whether individual patients are enrolled in an HMO.

Previous studies of health care utilization have found that areas with a higher number of physicians per capita also tend to have higher spending on health care. We found the opposite to be true for drug spending. After risk adjustment, high-spending states have significantly lower numbers of physicians per capita (223 vs. 333 physicians per 100,000 population). It is not clear how to interpret this relationship. The number of pharmacies per capita is significantly higher in high-spending states (23 vs. 19 per 100,000 population).

We ran multiple regressions of combinations of these factors. This analysis was complicated by the high level of correlation among so many of the factors. In all of our models in which it was included, self-reported health status remained a statistically significant factor. Even after controlling for health status, the number of physicians per capita also remains significant, with an increase in physicians reducing spending.

Figure 5. Differences Between Low-Spending and High-Spending States, After Risk Adjustment

Factor	Mean for the 15 states with the lowest spending	Mean for the 15 states with the highest spending
Projected spending per beneficiary in 2006, Not Risk Adj.***	1482	1682
Projected spending per beneficiary in 2006, Risk Adj.***	1519	1685
Population Density (# per sq. mile)	938	94
% of people living in a metropolitan area	69.6	63.2
% high school graduate or higher **	86.8	82.6
% bachelor's degree or higher**	29.1	22.9
Median income**	45536	38450
% reporting good or better health status***	86.4	81.5
% heavy drinkers***	6.6	4.3
% with asthma	12.1	11.4
% with high cholesterol	31.5	33.2
% with diabetes (not pregnancy related) **	6.7	8.2
% limited by physical, mental, emotional problems**	17.4	20.2
% with hypertension**	24.4	28.5
% Smoke Everyday*	16.3	19.2
% Former Smokers***	27.1	22.2
% Current Smokers*	21.5	24.3
% Medicare Enrollees Under Age 65***	13.9	18.3
% Medicare Enrollees Over Age 85**	12.0	10.0
HMO Penetration Rate *	24.5	13.7
Non-Federal Physicians per 100,000 pop.**	333	223
Pharmacies per 100,000 population **	19	23
Pharmacists per 100,000 population	154	127
Median Retail Price per Pill, All Customers	2.25	2.25
Median Retail Price per Pill, Third-Party Cust.	2.37	2.36
Median Retail Price per Pill, Cash Customers **	2.27	2.14

* Significant at the .05 level
** Significant at the .01 level
***Significant at the .001 level

Policy Considerations and Areas for Further Research

The clear conclusion from our analysis of geographic variation in utilization is that the variation is not minimal. Our analysis of projected Part D plan premiums shows how the state-level variations could have a real impact on the cost of the new benefit to Medicare beneficiaries, depending on where they live. This finding triggers the need to identify and consider policy options that might reduce or eliminate these premium differences.

Because the geographic variation in retail prices paid by third-party payers is minimal, a plan payment adjustment for geographic variation in drug prices may be unnecessary. In fact, the Secretary decided not to make an adjustment for geographic variation in prices for the first year of the Part D benefit. The Department may want to monitor and explore further whether the higher drug prices faced by residents of Hawaii and Puerto Rico lead to significantly higher premiums.

Further exploration also seems warranted to monitor price variation under Medicare Part D. To the extent that price variation increases, however, it will be difficult to disentangle the effects of plan competition from underlying price differences.

Our analysis suggests that some aspects of health status remain as a source of variation leading to geographic spending differences, even after application of the risk adjuster. More research is needed to confirm and strengthen this finding and then to identify ways to improve the risk adjuster. We plan to do additional research to explore the variations in utilization across different therapeutic categories. Some analyses of commercial data suggest the patterns of geographic variation are not the same across drug categories. It would be important to understand whether these variations arise because of geographic differences in disease prevalence or because of the prescribing patterns of health professionals trained and practicing in different regions.

Some supply and health system factors also seem to influence use of drugs, since higher use or spending is related to the presence of more drug stores and fewer HMOs. But the relationship of higher drug use to fewer physicians per capita is an anomaly. To the extent that factors like these in fact influence geographic patterns of drug spending, policymakers will face a choice of whether to leave these variations in the premiums that beneficiaries face or to make adjustments. By one argument, differences can be addressed by the market by creating incentives to the plans to reduce excess utilization. By another argument, they are uncontrollable factors and beneficiaries should be insulated from their effect.