NOVEMBER 2018

ESTIMATING THE POTENTIAL HEALTH CARE SAVINGS OF REFERENCE PRICING

American Academy of Actuaries

AMERICAN ACADEMY of ACTUARIES
Objective. Independent. Effective.™

ACTUARY.ORG

The American Academy of Actuaries is a 19,500-member professional association whose mission is to serve the public and the U.S. actuarial profession. For more than 50 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

American Academy *of* Actuaries

Objective. Independent. Effective.

AMERICAN ACADEMY OF ACTUARIES
1850 M STREET NW, SUITE 300, WASHINGTON, D.C. 20036
202-223-8196 | WWW.ACTUARY.ORG

Contents

Executive Summary 1
- Data and methods 1
- Results 2
- Caveats 2

Introduction 3

Price Variability and the Potential for Health Care Savings 5

Prior Research 7

Data and Methods 10

Results 16
- Scenario 1: Savings assuming no behavioral changes 16
- Scenario 2: Savings assuming higher-price providers lower prices 17
- Scenario 3: Savings assuming consumers switch to lower-cost providers 18
- Scenario 4: Savings assuming behavioral changes among both providers and consumers 19
- Sources of Savings 20

Discussion 25

References 31

This research was conducted primarily by Steve Jackson, with guidance from Donna Novak and Cori Uccello. The report also benefited from helpful comments from two peer reviewers and participants in a pre-publication workshop.

Executive Summary

High and rising health care prices play a major role in the persistent increases in health care spending. This study, undertaken by the American Academy of Actuaries Health Practice Council, explores the potential for reference pricing to counter high health care prices and contain health care spending growth. Reference pricing is a system in which an insurer selects a price it is willing to pay for a health care service. Enrollees who obtain care from a provider with a price at or below the reference price pay only the normally required cost sharing (e.g., deductibles, coinsurance). Enrollees obtaining care from a higher-priced provider pay not only the normally required cost sharing but also an additional cost, typically the difference between the reference price and the allowed charge. Such a system can provide consumers the incentive to seek care at lower-cost providers and can also put pressure on providers to lower their prices.

To date, the use of reference pricing has been fairly limited, and research has focused mostly on examining the savings associated with implementing reference pricing for a limited number of health care services. This study expands upon prior reference pricing work. It estimates the impact of reference pricing if it were expanded to a broader set of services and examines the sensitivity of savings both to the variation in where the reference price is set and to variations in the extent to which providers lower their prices and consumers switch to lower-priced providers.

Data and methods

The study uses 2013–2015 data from the Health Care Cost Institute[1] (HCCI) to examine claims for people younger than age 65 and covered by employer-sponsored health insurance. Shoppable services—services in which consumers are in a position to choose their provider based, in part, on price—are identified based on work by previous researchers. These shoppable services account for 43 percent of all health care spending in the dataset. At the hospital referral region (HRR) level, a reference price is determined for each shoppable service, based on the distribution of allowed charges. Three reference price threshold scenarios are examined, using the 65th, 60th, and 55th percentiles of allowed charges. Low, medium, and high degrees of provider price reductions and consumer switching to lower-cost providers are also examined.

1 https://www.healthcostinstitute.org/about-hcci

Results

Potential savings arising from reference pricing are calculated under four illustrative scenarios, which vary whether providers lower prices and/or consumers switch to lower-priced providers. Under the scenarios examined, savings from reference pricing could reduce the spending for shoppable services by 0 to 28 percent (or 0 to 12 percent of the spending for all services). The low end of the savings range reflects low or no changes in provider or consumer behavior, so that reference pricing would reduce costs to plans but would shift those costs to consumers who receive care at higher-priced providers. The high end of the savings range would require large changes in behavior, especially substantial price reductions among high-priced providers, but also consumers shifting to lower-price providers.

Caveats

Although the potential for savings under a broader adoption of reference pricing is significant, several factors could limit actual savings. For instance, if providers with prices below the reference price threshold increase their prices, savings would be offset, at least in part. In addition, although the set of services included in the analysis are theoretically shoppable, some of the services included may be difficult to shop for in practice. Perhaps more importantly, language in provider contracts that prohibits insurers from steering patients to lower-cost providers can make it difficult to implement a reference pricing program.

Ultimately, significant savings through a reference pricing program is possible. For that potential to be realized, however, higher-priced providers would need to lower their prices, consumers would need to switch to lower-priced providers, price and quality transparency would need to be available, quality providers who provide services at or below the reference price would need to be available in sufficient numbers, and any legal, regulatory, or contractual barriers to reference price programs would need to be addressed.

Introduction

Health care spending in the U.S. continues to increase as a share of the nation's economy and focus has returned to health care prices as a major reason why. Many recent studies have reaffirmed that while utilization levels in the U.S. are similar to those in other developed countries, prices in the U.S. are higher.[2] Several options may hold promise for lowering health care spending, including value-based payments, bundled or episode-based payments, and high deductible or consumer directed insurance plans. This study, undertaken by the American Academy of Actuaries Health Practice Council, explores an option that focuses more directly on reducing prices to reduce health care spending—reference pricing.

Reference pricing refers to a system in which an insurer (or other payer such as an employer) selects a price that it is willing to pay for a health care service or procedure. Enrollees who obtain care from a provider with a price at or below the reference price pay only the normally required cost sharing (e.g., deductibles, coinsurance). Enrollees obtaining care from a higher-priced provider pay not only the normally required cost sharing but also an additional cost, typically the difference between the reference price and the allowed charge. Such a system can provide consumers the incentive to seek care at lower-cost providers and can also incent providers to lower their prices. Reference pricing requires price transparency to support informed enrollee decision-making and to encourage enrollees to seek care at lower-cost providers.

To date, the use of reference pricing has been fairly limited. The California Public Employees' Retirement System (CalPERS) introduced reference pricing for hip and knee replacements in 2011 and now uses it for 12 inpatient procedures.[3] The Safeway grocery store chain introduced a reference pricing pilot project for colonoscopies in its health insurance plan for non-unionized employees in 2009.[4] In 2011, the Safeway program was implemented for lab services, including both tests and imaging, covering a total of 492 procedure and service codes.[5]

2 Austin Frakt and Aaron Carroll, "Why the U.S. Spends So Much More than Other Nations on Health Care," *New York Times (Online)*, January 2, 2018.
3 James Robinson and Timothy Brown, "Increases in Consumer Cost Sharing Redirect Patient Volumes and Reduce Hospital Prices for Orthopedic Surgery," *Health Affairs* 32, no. 8 (2013): 1392–97 for hip and knee beginning. CalPERS and Pension and Health Benefits Committee, "Health Benefit Design Proposals for 2018: Agenda Item 6" (CalPERS, April 18, 2017) for expansion to 12 procedures in 2018.
4 James Robinson and Kimberly MacPherson, "Payers Test Reference Pricing And Centers of Excellence To Steer Patients To Low-Price And High-Quality Providers," *Health Affairs* 31, no. 9 (2012): 2028–36 describe the 2009 Safeway pilot project.
5 James Robinson, Christopher Whaley, and Timothy Brown, "Association of Reference Pricing for Diagnostic Laboratory Testing with Changes in Patient Choices, Prices, and Total Spending for Diagnostic Tests," *JAMA Internal Medicine*, September 2016 describe the March 2011 start to Safeway reference pricing program for lab tests; James Robinson, Christopher Whaley, and Timothy Brown, "Reference Pricing, Consumer Cost-Sharing, and Insurer Spending for Advanced Imaging Tests," *Medical Care* 54, no. 12 (December 2016): 1050–55 describe the November 2011 start to Safeway program for imaging services. L. Doug Melton et al., "Reference-Based Pricing: An Evidence-Based Solution for Lab Services Shopping," *The American Journal of Managed Care* 20, no. 12 (December 2014): 1033–40 provide the exact number of included CPT codes in lab services.

Previous studies of reference pricing programs found they can lower health spending for the particular procedures included in the program but have only modest impacts on overall health spending. However, these studies typically have focused on a limited set of health care services. This study expands upon prior work by estimating the impact of reference pricing if it were expanded to a broader set of services and by examining the sensitivity of savings both to the variation in where the reference price is set and to variations in the extent to which providers lower their prices and consumers switch to lower-priced providers. These extensions of prior research will allow for a more comprehensive assessment of the potential impact of reference pricing.

Price Variability and the Potential for Health Care Savings

The potential for reference pricing to produce health care savings depends on the extent to which prices for particular health care services vary within geographic areas. The wider the variation, the greater the potential for savings. For this analysis, we examine allowed charges, which in general reflect payment rates that the insurer has negotiated with the provider. For in-network services, allowed charges incorporate discounts off of the provider's initial charge.[6] Unless otherwise noted, this analysis uses the terms "price" and "allowed charge" interchangeably.

For the most common inpatient services (major joint replacements) and outpatient services (office visits), we examined the ratio of the 90th percentile to the 10th percentile allowed charges in each hospital reference region (HRR). The larger the ratio, the greater the variation, and the greater the potential for savings. At the median, allowed charges among the 90th percentile for major joint replacements are almost triple those of allowed charges at the 10th percentile (Table 1). For office visits, allowed charges at the 90th percentile are double those at the 10th percentile, again at the median. In some HRRs, the ratio is much higher. For instance, in the HRR with the largest ratio for hip and knee replacement, allowed charges at the 90th percentile are 80 times those charged at the 10th percentile. For office visits, the maximum observed 90:10 ratio is 5.5. This variation illustrates the potential for savings through reference pricing.

TABLE 1 **Variation in Allowed Charges for Select Services**

	Ratio of 90th Percentile Allowed Charge to 10th Percentile Allowed Charge, at the HRR level	
	Major Joint Replacement (Hip or Knee), Without Major Complications	**Mid-level Office Visit, Established Patients**
Minimum	1.26	1.34
25th Percentile	2.06	1.83
Median	2.60	2.05
75th Percentile	3.35	2.35
Maximum	80.05	5.49

Source: American Academy of Actuaries calculations of 2013-2015 HCCI data.
Note: Data reflect population younger than 65 with employer-sponsored coverage.

6 For out-of-network providers, insurers can determine allowed charges based on a percentage of usual, customary, and reasonable (UCR) charges.

If reference pricing is not accompanied by a shift to lower prices among providers or a shift to lower-priced providers among consumers, then the reductions in costs for insurers and employers would merely be transferred to consumers, who would be responsible for the difference between the reference price and the provider's allowed charge. While some hospitals have chosen to waive the collection of charges above the reference price,[7] it is unclear whether providers would be willing to waive such charges under a more broadly implemented reference pricing program. Nevertheless, the reductions in insurer and employer health spending could lead to premium reductions, leaving consumers in the aggregate no better or no worse off (although enrollees choosing care above the reference price could be worse off and those choosing care at or below the reference price could be better off).[8]

Achieving savings in overall health care spending depends on consumers shifting from higher-priced to lower-priced providers and on higher-priced providers lowering their prices. Such savings would be reflected in lower premiums as well as lower out-of-pocket costs.

Several factors limit the savings that could be realized from reference pricing. First, not all medical procedures are appropriate to subject to reference pricing. Reference pricing is only feasible when consumers are in a position to choose their provider, based in part, on price—in other words, the services are "shoppable." This would rule out emergency procedures, or procedures which, owing either to their highly specialized nature or to the scarcity of providers in a particular area, are only available from one provider in a region. Second, the reference price must be set high enough to ensure that high-quality providers are available in all locations. Yet, the higher the reference price the smaller the potential savings, as fewer providers will exceed the reference price and fewer consumers and providers will have an incentive to reduce costs. Third, consumers might not be sufficiently price-aware or price-sensitive to change their behavior and move to lower-cost providers. In this case, providers would have little incentive to lower their costs. Finally, as noted above, there must be variability in pricing for the same procedures within health care markets in order to achieve savings through reference pricing; less variability means less opportunity for savings.

7 Amanda Lechner, Rebecca Gourevitch, and Paul Ginsburg, "The Potential of Reference Pricing to Generate Savings: Lessons from a California Pioneer: Research Brief Number 30" (Center for Studying Health System Change, December 2013).
8 Because some administrative costs are fixed, premium reductions likely would be less than the reduction in plan claim costs.

Prior Research

Several studies have evaluated the CalPERS and Safeway reference pricing experiences, examining not only the impacts on costs but also the behavioral effects. In addition, researchers have used claims data to estimate potential savings from reference pricing, both for particular services and for a broader set of shoppable services.

Table 2 summarizes studies of the CalPERS and Safeway experiences. The evaluations examined particular procedures, in distinct populations, and sometimes with different reference price thresholds; therefore results are not necessarily comparable between studies. Nevertheless, each study found that reference pricing produced savings and resulted in consumers switching to lower-cost providers. Savings ranged from 10 percent for MRI imaging in the Safeway program to 32 percent for diagnostic lab testing in the Safeway program, both using a reference price at the 60th percentile. The percentage of consumers switching to lower-cost providers ranged from 9 percent to 29 percent, depending on the procedure. One study estimated not only the share of consumers who switched to lower-cost providers but also the reduction in prices charged among high-priced providers; high-priced hip and knee replacement providers in the CalPERS program lowered their prices by 34 percent. Interestingly, procedures with higher shares of consumers switching weren't necessarily the ones with the highest savings, suggesting that provider price reductions are also an important factor.

TABLE 2 **Reference Pricing in Practice, Impact on Savings and Behavior**

	Procedure(s)	Reference Price (Percentile)	Savings	% of Consumers Switching from Higher to Lower Cost Providers	Reduction in Prices Charged Among High-Priced Providers
CalPERS[i]	Cataract Surgery	66th	17.9%	8.6%	n.a.
CalPERS[ii]	Colonoscopy	66th	21.0%	17.6%	n.a.
CalPERS[iii]	Hip and Knee Replacement	66th	20.2%	28.5%	34.3%
CalPERS[iv]	Arthroscopy: Knee	66th	17.6%	14.3%	n.a.
CalPERS[iv]	Arthroscopy: Shoulder	66th	17.0%	9.9%	n.a.
Safeway[v]	492 CPT Codes, Lab Services	50th	20.8%	12.0%	n.a.
Safeway[vi]	Diagnostic Lab Testing	60th	31.9%	25.2%	n.a.
Safeway[vii]	Imaging: CT	60th	12.5%	9.0%	n.a.
Safeway[vii]	Imaging: MRI	60th	10.5%	16.6%	n.a.

Notes: n.a. Not available—study did not explicitly estimate the reduction in prices charged

[i] James Robinson, Timothy Brown, and Christopher Whaley, "Reference-Based Benefit Design Changes Consumers' Choices and Employer Payments for Ambulatory Surgery," *Health Affairs* 34, no. 3 (2015): 415–22.
[ii] James Robinson et al., "Association of Reference Payment for Colonoscopy With Consumer Choices, Insurer Spending, and Procedural Complications," *JAMA Internal Medicine* 175, no. 11 (2015): 1783–89.
[iii] James Robinson and Timothy Brown, "Increases in Consumer Cost Sharing Redirect Patient Volumes and Reduce Hospital Prices for Orthopedic Surgery," *Health Affairs* 32, no. 8 (2013): 1392–97.
[iv] James Robinson et al., "Consumer Choice Between Hospital-Based and Freestanding Facilities for Arthroscopy; Impact on Prices, Spending and Surgical Complications," *The Journal of Bone and Joint Surgery* 97, no. 18 (September 16, 2015): 1473–81.
[v] Melton et al., "Reference-Based Pricing: An Evidence-Based Solution for Lab Services Shopping," *The American Journal of Managed Care* 20, no. 12 (2014) 1033-1040.
[vi] James Robinson, Christopher Whaley, and Timothy Brown, "Association of Reference Pricing for Diagnostic Laboratory Testing with Changes in Patient Choices, Prices, and Total Spending for Diagnostic Tests," *JAMA Internal Medicine* (September 2016).
[vii] Robinson, Whaley, and Brown, "Reference Pricing, Consumer Cost-Sharing, and Insurer Spending for Advanced Imaging Tests," *Medical Care* 54, no. 12 (2016) 1050-1055.

The estimates in these studies provide valuable information on the savings associated with particular procedures in particular programs. Other studies provide information useful to better understand the savings potential of extending reference pricing to a broader range of services or larger enrollee populations.

In a 2014 study, Chapin White and Megan Eguchi defined a set of 350 shoppable services that would be amenable to the price shopping required for reference pricing.[9] They then used a medical claims database for autoworkers (mostly in Michigan) to assess the savings that might have been realized by imposing a reference price at the 65th percentile. They assumed that 30 percent of consumers would switch from higher- to lower-price providers, and made no assumption that higher-price providers would reduce their costs. They found that spending for the shoppable services could be reduced by 14 percent. Since shoppable services accounted for 35 percent of total health care spending of the study population, reference pricing would have reduced total health care spending by 5 percent.

9 Chapin White and Megan Eguchi, "Reference Pricing: A Small Piece of the Health Care Price and Quality Puzzle, Research Brief No. 18" (National Institute for Health Care Reform, October 2014).

Moving beyond a particular state, Paul Fronstin and M. Christopher Roebuck at the Employee Benefit Research Institute (EBRI) examined six services (overlapping with the ones covered by CalPERS [hip and knee replacement, and colonoscopy] and by Safeway [MRI and CT]) using a national claims database, Truven's MarketScan data, to estimate the impact of a reference price at the 67th percentile.[10] Using a sample of almost 3 million individuals in 2010, they estimated savings of about 2 percent of all medical expenditures if all consumers who were served by providers above the reference price switched to providers at the reference price. This estimate approximates the upper bound of savings that could be realized by applying reference pricing to these six services.

Combining the broad range of shoppable services with its own national claims database, Amanda Frost and David Newman at the Health Care Cost Institute (HCCI) examined the proportion of services which are shoppable and the variation in prices for shoppable and non-shoppable services. They found that 43 percent of spending is shoppable and the variation for some shoppable services is lower than for non-shoppable services. The study suggests that because plan design features such as deductibles, copays, and coinsurance can mask true price differences, the likely impact of price transparency on changing consumer behavior is minimal. This might imply that reference pricing could enable price transparency to be more effective by better linking cost-sharing differences to the true price differences for services.[11]

In this study, we build on prior study methods and findings to explore the implications of reference pricing for a broad set of shoppable services. We use the HCCI national claims database to illustrate potential savings under different scenarios with varying program designs and behavioral assumptions.

10 Paul Fronstin and M. Christopher Roebuck, "Reference Pricing for Health Care Services: A New Twist on the Defined Contribution Concept in Employment-Based Health Benefits, Issue Brief No. 398" (Employee Benefit Research Institute, April 2014).

11 Amanda Frost and David Newman, "Spending on Shoppable Services in Health Care, Issue Brief #11" (Health Care Cost Institute, March 2016). HCCI data were also used in a different study to model the consequences of replicating nationally the CalPERS reference pricing model for colonoscopies. While that study estimated that $95 million would be saved if all three companies providing data to HCCI extended the reference price model to all of their patients, HCCI does not provide a basis for estimating the percent of total costs this would represent (neither of the cost of colonoscopies, nor of total health care costs). See Christopher Whaley, Timothy Brown, and James Robinson, "Using Data to Lower Costs: California's Reference-Based Payment Experience and Implications for Other States, Issue Brief" (Health Care Cost Institute, 2016).

Data and Methods

This study uses HCCI claims data, which includes population-weighted and aggregated claims data for over 50 million people covered by Aetna, Humana, and UnitedHealthcare. We used claims data from 2013–2015 and restricted the sample to people younger than age 65 and covered by employer-sponsored insurance. All data were de-identified and are compliant with the Health Insurance Portability and Accountability Act. Data used in our analysis include inpatient, outpatient, and physician services claims, but not prescription drug claims.

We initially limited our analysis to the 350 shoppable services (75 inpatient and 275 outpatient services) identified by White and Eguchi and also examined by HCCI. We replicated the procedures described in both White and Eguchi and HCCI as much as possible: We restricted our sample to people younger than 65 with employer-sponsored insurance; we focused on the allowed charges for each procedure or service; we eliminated all inpatient claims that were preceded by an emergency visit within three days; we combined all inpatient claims for a single admission and eliminated those which summed to a negative charge; and we combined facility outpatient and physician claims for the same encounter into aggregated outpatient claims. Similarly to White and Eguchi, we eliminated from the analysis any procedure or service in any HRR when that service was provided fewer than five times (they used three times as their minimum) in the particular HRR; and similarly to Frost and Newman (2016), we adjusted our sample to match the age-gender composition of employer-sponsored insurance participants by state and year. Because we used claims from three years, we trended claim costs from 2013 and 2014 to 2015 levels based on national average prices for each procedure or service.

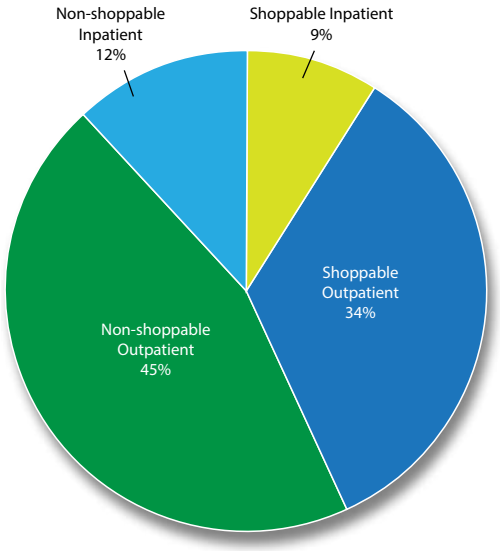
We have focused on allowed charges, rather than total charges by providers. As noted above, allowed charges are net of any negotiated discounts or other reductions in provider charges and better reflect actual health spending. Many reference price programs set the reference price threshold based on allowed charges, and prior research on reference pricing has also focused on allowed charges.

These procedures produced a dataset of claims covering 71 different inpatient procedures and 191 different outpatient procedures. Shoppable services in our dataset are a subset of the 350 services identified by White and Eguchi (2014). Over the three-year period, the dataset includes an average 32 million covered lives, nearly 300 million claims, and $50 billion in

allowed charges per year. The majority of claims are for outpatient services—less than 1 percent of the number of claims was for inpatient services and 21 percent of total allowed charges were for inpatient services.

This study focuses on shoppable services. Of all allowed charges, 43 percent were for shoppable services—9 percent were for shoppable inpatient services and 34 percent were for shoppable outpatient services (Figure 1). Shoppable outpatient services are much more numerous than shoppable inpatient services, with a much lower average cost. The average cost for shoppable outpatient care was $129 per service compared with $19,000 per service for shoppable inpatient care.

FIGURE 1 **Distribution of Allowed Charges**



Shoppable services include 350 services identified by White and Eguchi (2014).

We used the Dartmouth Atlas' definition of hospital referral regions (HRRs) to describe a geographic area in which a consumer might choose a provider.[12] Within each HRR, we set the reference price threshold (e.g., the 65th percentile) for each inpatient service (defined

12 "Hospital referral regions (HRRs) represent regional health care markets for tertiary medical care that generally requires the services of a major referral center. The regions were defined by determining where patients were referred for major cardiovascular surgical procedures and for neurosurgery. Each hospital service area (HSA) was examined to determine where most of its residents went for these services. The result was the aggregation of the 3,436 hospital service areas into 306 HRRs. Each HRR has at least one city where both major cardiovascular surgical procedures and neurosurgery are performed." The Dartmouth Atlas of Health Care, "Data by Region."

at the diagnostic related group [DRG] level) or outpatient service (defined at the Current Procedural Terminology [CPT] or Healthcare Common Procedure Coding System [HCPCS] level).

Reference price threshold: We estimated results for three different reference price thresholds: the 65th percentile, the 60th percentile, and the 55th percentile, which approximates the range used in practice by the CalPERS and Safeway reference price programs. For each reference price, we varied the assumptions regarding the extent to which higher-price providers lowered their prices and the percent of consumers switching from higher- to lower-price providers.

Provider behavioral assumptions: We estimate savings from reference pricing under various assumptions regarding the extent to which providers above the reference price threshold lower their prices. To develop provider behavior assumptions, we compared the reference price to the average allowed charges for providers above the reference price (Table 3) and assumed that providers may lower their prices to narrow the difference.

TABLE 3 **Differences Between Reference Prices and the Average Allowed Charge by Providers Above the Reference Price**

	Reference Price Threshold		
	65th Percentile	60th Percentile	55th Percentile
INPATIENT			
Reference Price	$20,436	$19,377	$18,479
Average Above	$29,835	$28,608	$27,479
% Difference	*31.5%*	*32.3%*	*32.8%*
OUTPATIENT			
Reference Price	$131	$120	$111
Average Above	$219	$207	$198
% Difference	*40.3%*	*42.0%*	*43.8%*

Source: American Academy of Actuaries calculations of 2013-2015 HCCI data.
Note: Data reflect population younger than 65 with employer-sponsored coverage.

For inpatient services at all reference price levels, a reduction of about 33 percent would bring the average costs of higher-cost providers down to the reference price. For outpatient services, a reduction of about 44 percent would bring higher-cost providers costs down to the reference price at all reference price levels. Based on these results, we model price reductions among higher-price providers of 5 percent (low), 20 percent (medium), and 33 percent (maximum) for inpatient services, and 5 percent (low), 25 percent (medium), and 45 percent (maximum) for outpatient services (Table 4).

TABLE 4 **Modeled Behavior of Providers—Reductions in Prices for Providers above the Reference Price**

Provider Price Lowering Assumption	Inpatient	Outpatient
Low	5%	5%
Medium	20%	25%
High	33%	45%

Consistent with others who have modeled the possible savings from reference pricing, we made the simplifying assumption that providers with prices below the reference price do not increase their prices. Any savings estimated from this analysis will be overstated to the extent that providers below the reference price increase their prices.[13]

Consumer behavioral assumptions: To model consumer switching behavior, we used the range of values reported in the CalPERS and Safeway evaluations (see Table 2 above), which ranged from 9 percent to 29 percent, with a median of 14 percent. These rates of switching were observed with different program designs and, in particular, with both surgical and diagnostic services. While the large price difference between surgical and diagnostic services might raise a question as to whether behavioral impacts would differ substantially, the results of the prior evaluations do not provide evidence of such a difference. Evaluations of CalPERS' more expensive surgical services report consumer switching rates ranging from 9 percent to 29 percent; evaluations of Safeway's less expensive diagnostic services report switching rates of 9 percent to 25 percent. Hence, it seems reasonable to rely on these ranges as a basis for selecting levels of switching to evaluate in our model. Approximating the range of observed consumer switching behavior, we use 10 percent (low), 15 percent (medium), and 30 percent (high) for consumer switching assumptions (Table 5).

TABLE 5 **Modeled Behavior of Consumers—Consumers Switching from Higher- to Lower-Price Providers**

	Consumers Switching
Low	10%
Medium	15%
High	30%

13 Paul Fronstin and M. Christopher Roebuck, "Reference Pricing for Health Care Services: A New Twist on the Defined Contribution Concept in Employment-Based Health Benefits, Issue Brief No. 398" (Employee Benefit Research Institute, April 2014) is one study that does estimate the impact of lower-price providers raising prices to the reference price. For two of the five procedures they examined, the raising of prices would more than offset any savings generated by higher-price providers reducing prices and by consumers switching to lower-price providers.

We modeled four scenarios, varying whether providers and/or consumers changed their behavior in response to reference pricing:

- Scenario 1: No provider price reductions; no consumer switching
- Scenario 2: Providers lower prices; no consumer switching
- Scenario 3: No provider price reductions; consumers switch to lower-cost providers
- Scenario 4: Providers lower prices; consumers switch to lower-cost providers

For Scenario 1, we modeled the savings to insurers and employers by calculating, for each HRR, the difference between the average price of those providers above the reference price and the reference price appropriate to the 65th, 60th, or 55th percentile, and multiplying that difference by the number of consumer claims above the reference price. For Scenario 2, we calculated the specified percentage reduction (5%, 20%, 33% for inpatient; 5%, 25%, 45% for outpatient; see Table 4 above) in provider prices from the average price for providers above the reference price and multiplied that amount by the number of consumer claims above the reference price. For Scenario 3, we calculated the difference between the average price for providers above the reference price and the average price for providers at or below the reference price, multiplying that difference by the number of consumers assumed to switch, calculated by multiplying the total number of claims above the reference price by the percentage of consumers switching (10%, 15%, 30%; see Table 5 above).[14]

For Scenario 4, we calculated the results in two ways yielding identical results in total savings, but varying somewhat regarding how savings are attributable to either providers reducing prices or consumers switching. In the first method, we assumed that providers above the reference price reduced their prices by the specified percentage (from Table 4), generating savings equal to difference in the original price and the reduced price. We then assumed that a specified percentage (from Table 5) of consumers switched to lower-price providers, generating additional savings equal to the difference between the now-reduced price above the reference price and the average price of providers at or below the reference price.

14 We modeled but do not report here the results with the alternative assumption that switching consumers move from providers at the average cost above the reference price to providers at the reference price. Results are materially the same, with slightly smaller savings in each scenario.

In the second method, we first assumed that a specified percentage (from Table 5) of consumers switched from higher- to lower-price providers, each generating savings equal to the difference in the original average price of higher-price providers and the average price of providers at or below the reference price. We then assumed that, for those consumers who did not switch, savings would arise from providers lowering their prices (from Table 4), with savings equal to the percentage price reduction (from Table 4) among higher-price providers multiplied by the original average price for providers above the reference price.

Notably, the analysis is not based on a stochastic microsimulation, which would vary behavioral responses among consumers and providers. Rather, estimated aggregate changes in spending reflect how assumed behavioral changes affect average spending. The overall results should be similar between the two methods, but any distributional impacts that can be modeled using a microsimulation analysis are not available using this more simplified method. We also have not modeled explicitly the relationship between the degree to which providers reduce prices and the extent to which consumers switch. While we would expect that larger reductions in price would lead to fewer consumers switching, we have no basis upon which to approximate the quantitative nature of that relationship. Instead, under Scenario 4, which incorporates both provider price reductions and consumer switching, we model all combinations of provider price reductions and consumer switching except we assume no consumer switching occurs when we assume the highest levels of provider price reductions (i.e., on average, providers reduce prices to the reference price).

The savings estimates presented below are meant to be illustrative in nature only and attempt to provide a reasonable range of possible outcomes. The analysis is not meant to be a best estimate of savings under an expanded reference pricing program. Nevertheless, the results can provide insights into the relative magnitude of savings, under different scenarios.[15]

15 The authors acknowledge the assistance of the Health Care Cost Institute (HCCI) and its data contributors, Aetna, Humana and UnitedHealthcare, in providing the claims data analyzed in this study.

Results

Scenario 1: Savings assuming no behavioral changes

If reference pricing is introduced and no behavioral changes occur—that is, higher-price providers do not reduce their prices and consumers do not switch from higher- to lower-price providers)—then savings will occur, but only for insurers. The balance would be shifted to consumers.

TABLE 6 **Insurer Savings for Shoppable Health Care Services at Various Reference Price Thresholds**

Scenario 1: Assuming No Behavioral Changes

	Average Allowed Charge (Baseline)	Average Savings for Shoppable Services, by Reference Pricing Threshold					
		65th Percentile		60th Percentile		55th Percentile	
		$	%	$	%	$	%
Inpatient	$19,181	$3,203	17%	$3,613	19%	$3,964	21%
Outpatient	$129	$29	23%	$33	26%	$37	29%
Total	$163	$35	22%	$40	24%	$44	27%

Source: American Academy of Actuaries calculations of 2013-2015 HCCI data.
Note: Data reflect population younger than 65 with employer-sponsored coverage.

Under a scenario in which reference prices are set at the 65th percentile and neither providers nor consumers change their behavior, plan spending would decline by 22 percent of total spending on shoppable services (including both the plan share and the consumer out-of-pocket share). With 43 percent of all expenditures paying for shoppable services, this result would mean a reduction in plan spending of 9.5 percent of total spending for all services, shoppable and non-shoppable.

Plan savings as a share of spending for shoppable services would be larger for outpatient services (23 percent of shoppable) than for inpatient services (17 percent of shoppable). Plan savings would increase with reductions in the reference price threshold; savings could reach 27 percent of spending on shoppable services if the reference price were lowered to the 55th percentile.

In a scenario with no behavioral changes, plan savings could reduce premiums for all consumers, but every dollar saved by an insurer or employer becomes an increased liability for consumers who receive care at prices exceeding the reference price. For instance, the average plan savings per service received is $35 under the 65th percentile reference price threshold. That means on average, consumers would face out-of-pocket costs $35 higher per

service. But those increased out-of-pocket costs would be borne only by those receiving care at higher-priced providers, meaning the increases for those receiving care at higher-priced providers would be greater than $35.

Total health spending, the sum of the insurer share and the consumer share, would not change; reference prices only reduce total health spending if there are changes in consumer and/or provider behavior.

Scenario 2: Savings assuming higher-price providers lower prices

Providers enter into price negotiations prior to each contract period. We analyze the savings that could result if higher-price providers reduce their prices but consumers do not switch from higher- to lower-price providers. Under this scenario, reference pricing could result in a 3 to 28 percent reduction in health spending for shoppable services (equal to a 1 to 12 percent reduction in spending for all services), depending on the reference price threshold and the degree of provider price reductions (Table 7).

TABLE 7 **Savings in Total Spending for Shoppable Services at Various Reference Price Thresholds**

Scenario 2: Assuming Price Reductions Among Higher-Cost Providers

Price Reduction Among Higher-Cost Providers	Average Allowed Charge (Baseline)	Average Savings for Shoppable Services, by Reference Price Threshold					
		65th Percentile		60th Percentile		55th Percentile	
		$	%	$	%	$	%
Inpatient	$19,181						
Low (5%)		$508	3%	$560	3%	$605	3%
Medium (20%)		$2,033	11%	$2,239	12%	$2,421	13%
High (33%)		$3,355	17%	$3,695	19%	$3,994	21%
Outpatient	$129						
Low (5%)		$4	3%	$4	3%	$4	3%
Medium (25%)		$18	14%	$20	15%	$21	17%
High (45%)		$33	26%	$36	28%	$38	30%
Total	$163						
Low		$5	3%	$5	3%	$5	3%
Medium		$22	13%	$24	15%	$26	17%
High		$39	24%	$42	26%	$46	28%

Source: American Academy of Actuaries calculations of 2013-2015 HCCI data.
Note: Data reflect population younger than 65 with employer-sponsored coverage.

Assuming the low price reduction scenario, the savings for shoppable services would be about 3 percent under each of the reference pricing thresholds. Higher degrees of provider price reductions would result in more savings, the magnitude of which would be sensitive to the reference price threshold. For medium and high levels of provider price reductions, for every 5-percentage-point reduction in reference price threshold, there would be a 2 percent savings in spending for shoppable services. More dramatic reductions in spending could occur with larger provider price reductions. Moving from low to medium or medium to high degrees of provider price reductions would yield an increase in savings of 10 to 14 percent. In other words, while a reduction in reference price thresholds would result in additional savings, greater savings would be realized through provider behavior changes. Importantly, the highest potential savings under this scenario, 28 percent of shoppable services, assumes that on average, higher-price providers reduce their prices to the reference price.

Scenario 3: Savings assuming consumers switch to lower-cost providers

We next examine the savings that could result if, absent any change in the prices of higher-price providers, some consumers switched from higher- to lower-price providers. Under this scenario, reference pricing could reduce total costs for shoppable services by 3 to 12 percent (or 1 to 5 percent of all expenditures, shoppable and not), depending on the reference price threshold and the degree of consumer switching.[16] Moving from the 65th percentile threshold to the 55th percentile threshold would increase savings by about 1 percentage point. Changing behavioral assumptions about consumer switching yields larger changes in savings—about 1 to 2 percent in moving from low to medium, and about 5 to 6 percent in moving from medium to high degrees of consumer switching. Once again, variations in behavior impact potential savings more than differences in the reference price threshold. Switching by consumers, producing a maximum of 12 percent savings in the assumption variations we examine in this scenario, would yield substantially less savings than reductions in cost by higher-cost providers, where we observe a maximum of 28 percent savings.

16 Scenario 3 most parallels the work by White and Eguchi (2014), who estimated that setting a reference price at the 65th percentile for a broad range of 350 shoppable services, and assuming 30 percent consumer switching, would reduce spending shoppable services by 14 percent. The corresponding estimate in Table 8 is 10 percent savings for shoppable services, also using a reference price at the 65th percentile and a 30 percent consumer switching assumption.

This likely arises because the provider-based assumptions reflect all higher-cost providers reducing prices—with only the extent of price reductions varying among scenarios. In contrast, the consumer-based assumptions reflect that only a share of consumers switch providers, with that share varying among scenarios.

TABLE 8 **Savings in Total Spending for Shoppable Services at Various Reference Prices**

Scenario 3: Assuming Consumer Switching to Lower-Cost Providers

Consumer Switching Assumption	Average Allowed Charge (Baseline)	Average Savings for Shoppable Services, by Reference Price Threshold					
		65th Percentile		60th Percentile		55th Percentile	
		$	%	$	%	$	%
Inpatient	$19,181						
Low (10%)		$551	3%	$606	3%	$653	3%
Medium (15%)		$826	4%	$909	5%	$980	5%
High (30%)		$1,652	9%	$1,819	9%	$1,960	10%
Outpatient	$129						
Low (10%)		$5	4%	$5	4%	$5	4%
Medium (15%)		$7	5%	$7	6%	$8	6%
High (30%)		$14	11%	$15	11%	$16	12%
Total	$163						
Low (10%)		$6	3%	$6	4%	$6	4%
Medium (15%)		$8	5%	$9	5%	$10	6%
High (30%)		$17	10%	$18	11%	$19	12%

Source: American Academy of Actuaries calculations of 2013-2015 HCCI data.
Note: Data reflect population younger than 65 with employer-sponsored coverage.

Scenario 4: Savings assuming behavioral changes among both providers and consumers

Finally, we model savings under assumptions that both high-price providers reduce prices and consumers switch to lower-price providers. Under this scenario, the potential savings in spending for shoppable services available from reference pricing ranges from 6 percent to 28 percent (3 to 12 percent of all expenditures) (Table 9). As with the other scenarios, more savings is available through increases in provider and consumer behavioral changes than in changes in the reference price threshold. In other words, savings from reference pricing are sensitive to assumptions regarding provider and consumer behavioral changes.

TABLE 9 **Savings in Total Spending for Shoppable Services at Various Reference Prices**

Scenario 4: Assuming Price Reductions Among Higher-Cost Providers and Consumer Switching to Lower-Cost Providers

Provider Price Reductions/ Consumer Switching	Average Allowed Charge (Baseline)	Average Savings for Shoppable Services, by Reference Price Threshold					
		65th Percentile		60th Percentile		55th Percentile	
		$	%	$	%	$	%
Inpatient	$19,181						
Low (5%, 10%)		$1,008	5%	$1,110	6%	$1,198	6%
Medium (20%, 15%)		$2,554	13%	$2,813	15%	$3,038	16%
High (33%, 0%)		$3,355	17%	$3,695	19%	$3,994	21%
Outpatient	$129						
Low (5%, 10%)		$8	6%	$8	7%	$9	7%
Medium (25%, 15%)		$22	17%	$24	19%	$26	20%
High (45%, 0%)		$33	26%	$35	28%	$38	30%
Total	$163						
Low		$10	6%	$10	6%	$11	7%
Medium		$27	17%	$29	18%	$31	19%
High		$39	24%	$42	26%	$46	28%

Source: American Academy of Actuaries calculations of 2013-2015 HCCI data.
Note: Data reflect population younger than 65 with employer-sponsored coverage.

Sources of Savings

The sources of savings can be better understood by examining the results of a particular scenario. Table 10 provides more detail regarding Scenario 4, in which the reference price is set at the 65th percentile and provider price reductions and consumer switching are at the medium level. As mentioned above in the Data and Methods section, we've calculated the savings by two different methods: In the first, we reduce provider prices for all consumers who used higher-price providers, and then we switched some percentage of those consumers to lower-price providers. In the second method, we first switch some consumers to lower-price providers, and then we reduce higher-price provider prices for those consumers who did not switch. Total savings, both for inpatient and outpatient services, are the same by the two methods, but the allocation of those savings to the two sources—consumers switching or providers reducing prices—varies.

Although the average allowed charge of shoppable inpatient services ($19,181) exceeds that of shoppable outpatient services ($129), the potential for savings is greater for outpatient services due to the much higher total volume of shoppable outpatient services—882 million services and $114 billion in spending for outpatient services versus less than 2 million shoppable inpatient services and $30 billion in spending for inpatient services. The rate of potential savings is greater for shoppable outpatient services (17 percent) than inpatient

services (13 percent), due to larger impacts of both provider and consumer behavioral changes. Savings from higher-price providers reducing their prices is 3 percentage points higher for outpatient than inpatient services, and savings from consumers switching to lower-price providers is 1 percentage point or less higher.

TABLE 10 **Sources of Savings for Shoppable Services, 65th Percentile Reference Price, Medium Levels of Consumer Switching and Provider Cost Reductions**

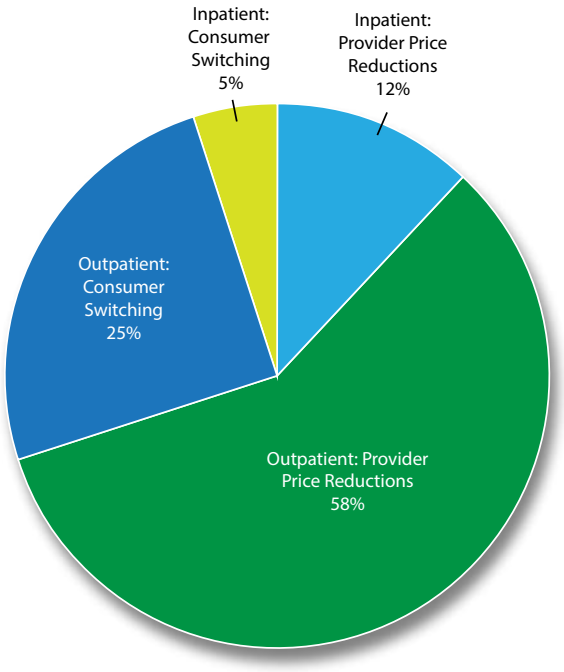
	Inpatient	Outpatient
Claims for Shoppable Services		
1. Weighted Count	1.6 million	882 million
2. Average Allowed Charge	$19,181	$129
3. Total Claims	$30.0 billion	$113.8 billion
4. Reference Price (65th Percentile)	$20,436	$131
Claims Above the Reference Price		
5. Weighted Count	0.5 million	296 million
6. Average Allowed Charge	$29,835	$219
Allocation of Savings, Method 1: Based on Providers Reducing Prices First		
7. Savings From Provider Price Reductions	$3.2 billion (11%)	$16.1 billion (14%)
8. Savings From Consumer Switching	$0.8 billion (3%)	$3.6 billion (3%)
9. Total Savings	$4.0 billion (13%)	$19.7 billion (17%)
Allocation of Savings, Method 2: Based on Consumers Switching First		
10. Savings From Provider Price Reductions	$2.7 billion (9%)	$13.7 billion (12%)
11. Savings From Consumer Switching	$1.3 billion (4%)	$6.0 billion (5%)
12. Total Savings	$4.0 billion (13%)	$19.7 billion (17%)

Source: American Academy of Actuaries calculations of 2013-2015 HCCI data.
Note: Data reflect population younger than 65 with employer-sponsored coverage.

Note: The count of claims is weighted to adjust the sample to match the age-gender composition of employer-sponsored insurance participants, by state and year.

In this scenario, for both inpatient and outpatient services, potential reference price savings are driven more by reductions in provider prices than by consumers switching to lower-price providers, due in part to the assumption that all providers lower their price whereas only a share of consumers switch to lower-priced providers. As a share of all potential reference price savings, 58 percent arises from provider price reductions for outpatient services (Figure 2). This is the result of a very large number of claims each saving a relatively modest amount (approximately $16 averaged across all claims, $46 averaged across claims above the reference price). An additional 12 percent of savings arises from provider price reductions for inpatient services. Consumer switching to lower-price providers for outpatient and inpatient services accounts for 25 percent and 5 percent of the potential savings, respectively.

FIGURE 2 **Sources of Savings Under Reference Price Threshold of 65th Percentile, Assuming Medium Levels of Provider Price Reductions and Consumers Switching**



Source: American Academy of Actuaries calculations of 2013-2015 HCCI data.
Note: Data reflect population younger than 65 with employer-sponsored coverage.

Tables 11 and 12 list the inpatient and outpatient services that account for the most savings when the reference price threshold is set at the 65th percentile and medium levels of consumer switching and provider reduction of costs are assumed. The top 10 inpatient procedures (of the 71 inpatient services considered shoppable and for which data were available) produce 50 percent of all the inpatient savings. Joint replacements, births, and gastrointestinal procedures make up seven of the top 10. These are all very frequent procedures with high variability at moderate to high prices. For outpatient services, the top 10 services (of the 191 outpatient services considered shoppable and for which data were available) in terms of potential reference price savings produced 30 percent of all savings generated by outpatient procedures. As will be discussed more below, some of the services with the highest savings are not necessarily traditionally thought of as shoppable.

TABLE 11 Top 10 Inpatient Services, Ranked by Savings As % of All Savings From Reference Pricing for Shoppable Services

65th Percentile Reference Price, Medium Switching, and Reduction

Rank	% of Savings	DRG Code	DRG Description
1	12%	470	Major Joint Replacement
2	8%	775	Vaginal Delivery w/o Complicating Diagnoses
3	6%	460	Spinal Fusion Except Cervical w/o MCC
4	5%	766	Cesarean Section w/o CC/MCC
5	4%	765	Cesarean Section w/ CC/MCC
6	3%	392	Digestive Disorders w/o MCC
7	3%	330	Major Small and Large Bowel Procedures w/ CC
8	3%	247	Perc Cadiovasc Proc w/ Drug-eluting Stent w/o MCC
9	3%	329	Major Small and Large Bowel Procedures w/ MCC
10	2%	25	Craniotomy and Endovascular Intracranial Procedures w/ MCC

Source: American Academy of Actuaries calculations of 2013-2015 HCCI data.
Note: Data reflect population younger than 65 with employer-sponsored coverage.

TABLE 12 Top 10 Outpatient Services, Ranked by Savings As % of All Savings From Reference Pricing for Shoppable Services

65th Percentile Reference Price, Medium Switching, and Reduction

Rank	% of Savings	CPT/HCPCS Code	CPT/HCPCS Description
1	6%	99213	Office/Outpatient Visit
2	6%	99214	Office/Outpatient Visit
3	3%	97110	Therapeutic Procedure, One or More
4	3%	74177	CT Abdomen & Pelvis w/ Contrast
5	3%	88305	Tissue Exam by Pathologist
6	2%	90999	Unlisted Dialysis Procedure
7	2%	93306	TTE w/Doppler Complete
8	2%	43239	EGD Biopsy Single/Multiple
9	2%	80053	Comprehensive Metabolic Panel
10	2%	45380	Colonoscopy, Flexible

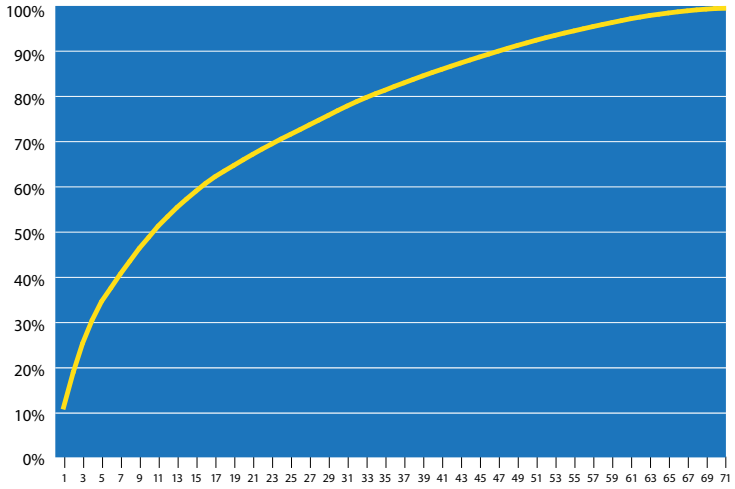
Source: American Academy of Actuaries calculations of 2013-2015 HCCI data.
Note: Data reflect population younger than 65 with employer-sponsored coverage.

Another view of the degree to which savings is concentrated among certain services is presented in Figures 3 and 4. These graphs show the cumulative share of all savings from shoppable inpatient and outpatient services, respectively, which are generated by the addition of each procedure, ranked from the procedure producing the most savings to that producing the least. These figures provide insights into how many procedures would need to be included in a reference pricing program to achieve a certain percentage of potential savings. For example, to capture 80 percent of the inpatient savings, 33 of the 71 procedures included in our analysis would need to be included (Figure 3). To capture 80 percent of

the outpatient savings, 82 of the 191 procedures would need to be included (Figure 4). In other words, for both inpatient and outpatient procedures, less than half of the procedures generate 80 percent of the potential reference price savings.

FIGURE 3 **Cumulative Inpatient Savings as % of Total Savings for Inpatient Shoppable Services by Number of Procedures**

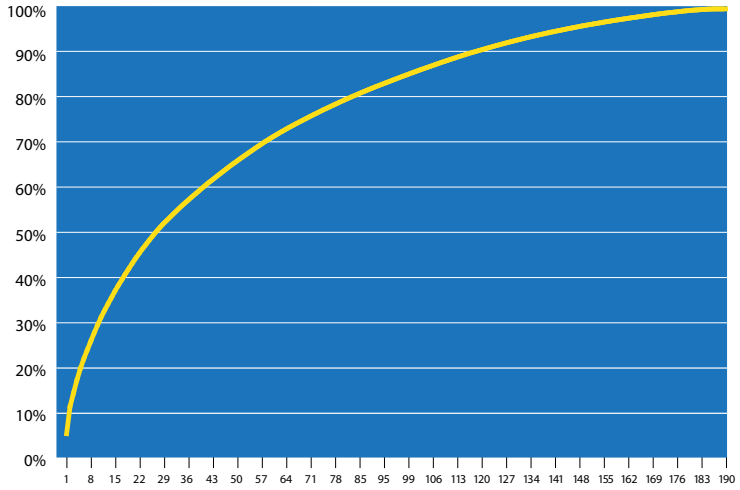
(65th Percentile Reference Price, Medium Switching by Consumers, and Medium Price Reduction by Providers)



Source: American Academy of Actuaries calculations of 2013-2015 HCCI data.
Note: Data reflect population younger than 65 with employer-sponsored coverage.

FIGURE 4 **Cumulative Outpatient Savings as % of Total Savings for Outpatient Shoppable Services by Number of Procedures**

(65th Percentile Reference Price, Medium Switching by Consumers, and Medium Price Reduction by Providers)



Source: American Academy of Actuaries calculations of 2013-2015 HCCI data.
Note: Data reflect population younger than 65 with employer-sponsored coverage.

Discussion

Our analysis explores the potential savings from implementing reference pricing for a broad range of shoppable services, based on a national sample of people under age 65 covered by employer-sponsored insurance. Under the illustrative scenarios examined, savings from reference pricing could reduce the spending for shoppable services by 0 to 28 percent, depending on the reference price threshold and the degree to which consumers and providers change their behavior. The low end of the savings range reflects low or no changes in provider or consumer behavior, so that reference pricing would reduce costs to plans but would shift those costs to consumers who receive care at higher-priced providers. The high end of the savings range would require large changes in behavior, especially substantial price reductions among high-priced providers, but also consumers shifting to lower-price providers. More moderate behavioral changes would lead to considerably lower savings. Although lower reference price thresholds could produce more savings than higher reference price thresholds, the changes in provider and consumer behavior examined have a larger effect on savings than do the relatively minor changes in the reference price threshold.

The shoppable services we examine in this analysis account for 43 percent of total spending for health care, excluding prescription drug spending. Hence, as a share of all non-Rx health care spending, reference pricing could potentially reduce total spending by up to 12 percent. Again, substantial changes in provider and consumer behavior would be needed to realize such savings through a reference pricing program. To put this into some context, research has suggested that Affordable Care Act (ACA) marketplace plans with narrow networks have premiums that are 16 percent lower than plans with broader networks.[17] But those savings reflect lower costs to the insurer rather than lower health spending overall; consumers could face higher out-of-pocket costs if they go to an out-of-network provider.

Our analysis is intended to be illustrative only, to provide insights on how broadening the use of reference pricing might lower health spending, and the magnitudes of behavioral changes that would be needed to achieve significant savings. Aside from changes in spending achieved by providers lowering prices or consumers switching to lower-cost providers, no other factors or changes in behavior were incorporated into the analysis. In addition, the analysis assumes that there would be enough providers of sufficient quality that consumers would have access to quality providers at or below the reference price.

17 Leemore Daffny et al., "Narrow Networks on the Health Insurance Marketplaces: Prevalence, Pricing, and the Cost of Network Breadth," *Health Affairs* 36, no. 9 (September 2017): 1606–14.

Savings from using reference prices could exceed those estimated here if reference price thresholds were set lower, behavioral responses were stronger, or if the set of services subject to reference prices were expanded beyond the set of shoppable services used in this analysis. Conversely, savings could be less than those estimated here if reference price thresholds were set higher, behavioral responses were weaker, or if the set of services subject to reference prices were more limited than the set of shoppable services used in this analysis.

Several factors could lead to savings lower than projected here. First, the analysis did not limit the application of reference pricing to areas with at least a minimum number of providers of a particular service, potentially overstating the ability to use reference pricing in a given area. For instance, an area with one hospital could have a distribution of prices for a given procedure, with different prices for different payers. This analysis would estimate a reference price based on such a distribution. However, any particular payer would face one price, making reference pricing inapplicable in practice. And even areas with more than one provider could be dominated by a particular provider. In 2016, 90 percent of metropolitan statistical areas (MSAs) were highly concentrated for hospitals, as measured by the Herfindahl-Hirschman Index (HHI).[18] This suggests that basing a reference price threshold on some point in the price distribution of claims would skew the threshold toward the dominant hospital, thus limiting reference price savings.

Second, this analysis makes the simplifying assumption that providers below the reference price would not increase their prices; if they do so, savings could be offset, potentially significantly.[19] In addition, savings could be overstated to the extent that providers offset price reductions by increasing the quantity of services provided or by shifting some costs to other services or payers. However, systematic research consistently finds modest or no evidence of cost shifting.[20] Instead, the ability of some providers to charge high prices reflects their strong market power.[21] To the extent that concentrated market power buffers providers from the downward pressure on prices initiated by reference pricing, we will have overestimated the potential savings from reference pricing.

18 Brent Fulton, "Health Care Market Concentration Trends in the United States: Evidence and Policy Responses," *Health Affairs* 36, no. 9 (September 2017): 1530–38.
19 See Paul Fronstin and M. Christopher Roebuck, "Reference Pricing for Health Care Services: A New Twist on the Defined Contribution Concept in Employment-Based Health Benefits, Issue Brief No. 398" (Employee Benefit Research Institute, April 2014).
20 See, for instance, Austin Frakt, "How Much Do Hospitals Cost Shift? A Review of the Evidence," *Milbank Quarterly* 89, no. 1 (March 2011): 90–130.
21 Jeffrey Stensland, Zachary Gaumer, and Mark Miller, "Private-Payer Profits Can Induce Negative Medicare Margins," *Health Affairs* 29, no. 5 (May 2010): 1045–51.

Third, if our definition of which services are shoppable is too expansive, then we will have overestimated potential savings. In this analysis, we relied on the work of White and Eguchi (2014), who defined 350 "shoppable services." Some of these services, however, might not be traditionally viewed as services for which consumers take an active role in choosing a provider. For instance, two of the outpatient procedures yielding the highest potential savings under reference pricing involve tissue biopsies (Table 12). Consumers do not usually get to voice a preference in where a tissue sample is sent for a biopsy. If such services were included in a reference price program, perhaps consumers would be able to work with their service providers to take a more active role in choosing a pathology provider, but it still would likely be difficult for consumers to do so. On the other hand, there is some evidence that even more services could be defined as shoppable. In our analysis, after excluding services with too few observations, we include a set of 71 inpatient and 191 outpatient "shoppable" procedures. Yet, Safeway is now covering about 450 laboratory tests and imaging services.[22] Expanding the set of shoppable services could increase the savings estimated here.

Even if a service is easily shoppable, however, consumers won't necessarily use information on price (and quality) to shop for it. The success of reference pricing in reducing health spending relies on consumers being price-sensitive, which in turn provides an incentive for higher-price providers to reduce their prices—the most important source of savings according to the findings reported herein. Price transparency is key to this process, as is a way for consumers to use price information to make their decisions. But research suggests that offering price transparency tools alone are not enough. Much of the research on tools designed to make prices transparent to health care consumers finds that the tools are infrequently used and they have little to no impact on reducing costs among those who do use them.[23] Even when large numbers of consumers used a tool, it still had no impact in reducing costs.[24] A study that did find a reduction in spending due to price information involved customer agents calling MRI patients to alert them to lower-price providers.[25]

22 Amanda Lechner, Rebecca Gourevitch, and Paul Ginsburg, "The Potential of Reference Pricing to Generate Savings: Lessons from a California Pioneer: Research Brief Number 30" (Center for Studying Health System Change, December 2013).
23 See, for example, Anna Sinaiko and Meredith Rosenthal, "Examining a Health Care Price Transparency Tool: Who Uses It, And How They Shop for Care," *Health Affairs* 35, no. 4 (2016); Sunita Desai et al., "Association between Availability of a Price Transparency Tool and Outpatient Spending," *Journal of the American Medical Association* 315, no. 17 (2016). In contrast, Sunita Desai et al., "Offering a Price Transparency Tool Did Not Reduce Overall Spending Among California Public Employees and Retirees," *Health Affairs* 36, no. 8 (August 2017): 1401–7, finds that consumers who used a price transparency tool had lower average prices for imaging services, but only 1 percent used the price tool.
24 Jon Gabel et al., "Price Transparency Tool Attracts Users but Does Not Lead to Use of Lower-Priced Services, Issue Brief" (Changes in Health Care Financing and Organization, Robert Wood Johnson Foundation, September 2016).
25 Sze-jung Wu et al., "Price Transparency for MRIs Increased Use of Less Costly Providers and Triggered Provider Competition," *Health Affairs* 33, no. 8 (August 2014).

Other research on MRIs suggests that referring physicians have a larger influence on where patients receive their MRIs than do insurance cost-sharing requirements, raising doubts that consumers shop for MRIs; consumers could find it even more difficult to shop for more complicated procedures.[26] Taken together with the CalPERS and Safeway experience in which consumers in their reference pricing programs switched to lower-price providers, these studies suggest that inducing changes in consumer behavior requires more high-touch price transparency tools, tying cost sharing more directly to provider prices (e.g., through reference pricing), incorporating incentives (and price and quality information) for providers to refer patients to lower-cost providers, or some combination thereof.

Aside from the extent to which reference pricing can help direct consumers to lower-cost providers and cause providers to reduce their prices, there are legal, regulatory, and practical considerations that could constrain a more widespread adoption of reference pricing. For instance, requiring that the higher out-of-pocket costs that consumers would face by using a provider above the reference price threshold count toward the plan's deductible or out-of-pocket limit would diminish the incentives for consumers to seek care at lower-priced providers. Jointly issued FAQs by the U.S. departments of Labor, Treasury, and Health and Human Services indicated that plans with reference pricing may, but would not be required to, include such balance bill payments toward the out-of-pocket maxima, which are limited under the ACA.[27] In order to exclude balance bill payments from the out-of-pocket maxima, however, plans would be required to meet quality and access standards. Especially in the absence of detailed regulations, these standards are vague and the reporting requirements may be administratively burdensome.

Another plan design issue is that the ACA requires coverage of preventive services with zero cost sharing, effectively preventing reference pricing for preventive services. Preventive services are a relatively small share of total health spending, so such limitations would have a negligible effect on the potential for reference pricing to reduce health spending. But efforts to protect consumers by limiting out-of-pocket payments or balance billing directly or indirectly would reduce the incentives for consumers to choose lower-price providers, reducing the impact of reference pricing.

26 Michael Chernew et al., "Are Health Care Services Shoppable? Evidence from the Consumption of Lower-Limb MRI Scans, Working Paper 24869" (National Bureau of Economic Research, July 2018).
27 See departments of Health and Human Services, Labor, and Treasury, "FAQs About Affordable Care Act Implementation (Part XXI)" (Center for Medicare and Medicaid Services, October 10, 2014).

Perhaps a more significant constraint on reference pricing's potential to reduce health spending is that many hospitals include restrictive language in their contracts that limit insurers' ability to steer consumers to less expensive rivals. These contractual provisions could include a hospital requirement that it be included in each of an insurer's plans, that the insurer not offer lower cost sharing for other hospitals, and that hospital prices not be disclosed.[28] And as noted above, providers with market power are able to charge higher prices. It may be difficult for reference pricing to counter market power or even to be implemented at all when such contractual provisions are in place.

As noted above, our analysis assumes that there would be enough providers of sufficient quality that consumers would have access to quality providers at or below the reference price. In reality, payers implementing reference pricing programs need to strive for a balance between setting the reference price low enough to capture savings, but high enough to assure access. In other words, payers could decide to set the reference price threshold on the higher side to achieve adequate access, thus reducing potential savings. Payers would also need to monitor provider quality.

It's also important to consider whether and how reference pricing fits in with the goal of moving the health care system to a system that is based on value so that it cost-effectively improves health outcomes. Reference pricing is a rather blunt instrument that directs consumers to lower-priced providers. But it doesn't address whether the treatment in question is appropriate and may or may not use quality measures to help guide consumers to providers. Value-based insurance designs attempt to more finely tune consumer cost-sharing requirements to encourage high-value treatments and discourage low-value treatments. But such designs don't necessarily direct consumers to lower-priced and higher-quality providers of those treatments. Value-based provider payments attempt to tie provider payments to cost efficiency and quality, to encourage higher-quality care, but may or may not include mechanisms to incent consumers to receive care at higher-value providers. While perhaps these different mechanisms could work together to provide the appropriate incentives to both consumers and providers, there are potential conflicts between them that could result in unintended effects. For instance, Brad Herring warns that if higher-quality providers receive higher payments in a value-based payment system, those higher prices could discourage consumers subject to reference pricing from receiving care from those

28 Anna Wilde Mathews, "Behind Your Rising Health-Care Bills: Secret Hospital Deals That Squelch Competition," *Wall Street Journal (Online)*, September 18, 2018. See also Gorman Actuarial, Inc., "Why Are Hospital Prices Different? An Examination of New York Hospital Reimbursement" (NYS Health Foundation, December 2016).

providers. Instead, consumers subject to reference pricing could have incentives to receive care from lower-quality providers with lower prices.[29] Incentives would need to be aligned to encourage treatment at cost-efficient and high-quality providers.

In summary, our analysis suggests that significant savings through a reference pricing program could be possible. For that potential to be realized, however, higher-priced providers would need to lower their prices; consumers would need to switch to lower-priced providers; price and quality transparency would need to be available; quality providers at or below the reference price would need to be available in sufficient numbers; and legal, regulatory, or contractual barriers to reference price programs would need to be addressed.

29 Bradley Herring, "An Unfortunate Inconsistency Between Value-Based Purchasing and Price Transparency," *Health Affairs Blog* (August 21, 2018).

References

CalPERS, and Pension and Health Benefits Committee. "Health Benefit Design Proposals for 2018: Agenda Item 6." CalPERS (April 18, 2017).

Chernew, Michael, Zack Cooper, Eugene Larsen-Hallock, and Fiona Scott Morton. "Are Health Care Services Shoppable? Evidence from the Consumption of Lower-Limb MRI Scans, Working Paper 24869." National Bureau of Economic Research (July 2018).

Cowling, David. "CalPERS Reference Pricing Program for Hip or Knee Replacement: Presentation before the National Governors Association Convening on State Employee and Retiree Health Care." CalPERS, Center for Innovation (June 25, 2013).

Cuckler, Gigi, Andrea Sisko, John Poisal, Sean Keehan, Sheila Smith, Andrew Madison, Christian Wolfe, and James Hardesty. "National Health Expenditure Projections, 2017 - 2026: Despite Uncertainty, Fundamentals Primarily Drive Spending Growth." *Health Affairs* 37, no. 3 (2018): 482–92.

Daffny, Leemore, Igal Hendel, Victoria Marone, and Christopher Ody. "Narrow Networks on the Health Insurance Marketplaces: Prevalence, Pricing, and the Cost of Network Breadth." *Health Affairs* 36, no. 9 (September 2017): 1606–14.

Departments of Health and Human Services, Labor, and Treasury. "FAQs About Affordable Care Act Implementation (Part XXI)." Center for Medicare and Medicaid Services (October 10, 2014).

Desai, Sunita, Laura Hatfield, Andrew Hicks, Michael Chernew, and Ateey Mehrotra. "Association between Availability of a Price Transparency Tool and Outpatient Spending." *Journal of the American Medical Association* 315, no. 17 (2016).

Desai, Sunita, Laura Hatfield, Andrew Hicks, Anna Sinaiko, Michael Chernew, David Cowling, Santosh Gautam, Sze-jung Wu, and Ateey Mehrotra. "Offering a Price Transparency Tool Did Not Reduce Overall Spending Among California Public Employees and Retirees." *Health Affairs* 36, no. 8 (August 2017): 1401–7.

Frakt, Austin. "How Much Do Hospitals Cost Shift? A Review of the Evidence." *Milbank Quarterly* 89, no. 1 (March 2011): 90–130.

Frakt, Austin, and Aaron Carroll. "Why the U.S. Spends So Much More than Other Nations on Health Care." *New York Times* (January 2, 2018).

Fronstin, Paul, and M. Christopher Roebuck. "Reference Pricing for Health Care Services: A New Twist on the Defined Contribution Concept in Employment-Based Health Benefits, Issue Brief No. 398." Employee Benefit Research Institute (April 2014).

Frost, Amanda, and David Newman. "Spending on Shoppable Services in Health Care, Issue Brief #11." Health Care Cost Institute (March 2016).

Fulton, Brent. "Health Care Market Concentration Trends in the United States: Evidence and Policy Responses." *Health Affairs* 36, no. 9 (September 2017): 1530–38.

Gabel, Jon, Elaine Swift, Angela Fontes, Rene Bautista, Matthew Green, and Can Geng. "Price Transparency Tool Attracts Users but Does Not Lead to Use of Lower-Priced Services, Issue Brief." Changes in Health Care Financing and Organization, Robert Wood Johnson Foundation (September 2016).

Gorman Actuarial, Inc. "Why Are Hospital Prices Different? An Examination of New York Hospital Reimbursement." NYS Health Foundation (December 2016).

Herring, Bradley. "An Unfortunate Inconsistency Between Value-Based Purchasing and Price Transparency." *Health Affairs Blog* (August 21, 2018).

Lechner, Amanda, Rebecca Gourevitch, and Paul Ginsburg. "The Potential of Reference Pricing to Generate Savings: Lessons from a California Pioneer: Research Brief Number 30." Center for Studying Health System Change (December 2013).

Mathews, Anna Wilde. "Behind Your Rising Health-Care Bills: Secret Hospital Deals That Squelch Competition." *Wall Street Journal* (September 18, 2018).

Melton, L. Doug, Kent Bradley, Patricia Lin Fu, Raegan Armata, and James Parr. "Reference-Based Pricing: An Evidence-Based Solution for Lab Services Shopping." *The American Journal of Managed Care* 20, no. 12 (December 2014): 1033–40.

Robinson, James, and Timothy Brown. "Increases in Consumer Cost Sharing Redirect Patient Volumes and Reduce Hospital Prices for Orthopedic Surgery." *Health Affairs* 32, no. 8 (2013): 1392–97.

Robinson, James, Timothy Brown, and Christopher Whaley. "Reference-Based Benefit Design Changes Consumers' Choices and Employer Payments for Ambulatory Surgery." *Health Affairs* 34, no. 3 (2015): 415–22.

Robinson, James, Timothy Brown, Christopher Whaley, and Kevin Bozic. "Consumer Choice Between Hospital-Based and Freestanding Facilities for Arthroscopy; Impact on Prices, Spending and Surgical Complications." *The Journal of Bone and Joint Surgery* 97, no. 18 (September 16, 2015): 1473–81.

Robinson, James, Timothy Brown, Christopher Whaley, and Emily Finlayson. "Association of Reference Payment for Colonoscopy With Consumer Choices, Insurer Spending, and Procedural Complications." *JAMA Internal Medicine* 175, no. 11 (2015): 1783–89.

Robinson, James, and Kimberly MacPherson. "Payers Test Reference Pricing And Centers of Excellence To Steer Patients To Low-Price And High-Quality Providers." *Health Affairs* 31, no. 9 (2012): 2028–36.

Robinson, James, Christopher Whaley, and Timothy Brown. "Association of Reference Pricing for Diagnostic Laboratory Testing with Changes in Patient Choices, Prices, and Total Spending for Diagnostic Tests." *JAMA Internal Medicine* (September 2016).

———. "Reference Pricing, Consumer Cost-Sharing, and Insurer Spending for Advanced Imaging Tests." *Medical Care* 54, no. 12 (December 2016): 1050–55.

Sinaiko, Anna, and Meredith Rosenthal. "Examining a Health Care Price Transparency Tool: Who Uses It, And How They Shop for Care." *Health Affairs* 35, no. 4 (2016).

Stensland, Jeffrey, Zachary Gaumer, and Mark Miller. "Private-Payer Profits Can Induce Negative Medicare Margins." *Health Affairs* 29, no. 5 (May 2010): 1045–51.

The Dartmouth Atlas of Health Care. "Data by Region."

Whaley, Christopher, Timothy Brown, and James Robinson. "Using Data to Lower Costs: California's Reference-Based Payment Experience and Implications for Other States, Issue Brief." Health Care Cost Institute (2016).

White, Chapin, and Megan Eguchi. "Reference Pricing: A Small Piece of the Health Care Price and Quality Puzzle, Research Brief No. 18." National Institute for Health Care Reform (October 2014).

Wu, Sze-jung, Gosia Sylwestrzak, Christiane Shah, and Andrea DeVries. "Price Transparency for MRIs Increased Use of Less Costly Providers and Triggered Provider Competition." *Health Affairs* 33, no. 8 (August 2014).

AMERICAN ACADEMY OF ACTUARIES
1850 M STREET NW, SUITE 300, WASHINGTON, D.C. 20036
202-223-8196 | **ACTUARY.ORG**