The Secret Menu in Health Care: A Cash Market for Imaging in California

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Abstract
In addition to the prices they negotiate with private health insurers, most providers also have a cash price schedule for patients who have the wherewithal to ask and are willing to pay in full when they receive a service. This is the first study that estimates the potential cost saving of allowing privately-insured consumers to observe both in-network negotiated prices and cash prices, which is of particular interest given the growing importance of high-deductible health plans and a recent executive order mandating greater price transparency. Using data from five private health insurers and 142 imaging facilities in the San Francisco Bay Area, we estimate that patients could save between 10% and 22% of their insurer's in-network price by paying cash. Potential savings are much larger (between 45% and 64% of their insurer's in-network price) if consumers observe both cash and in-network prices and select the facility in the region offering the lowest price for a particular service.

What do we already know about this topic?
Health insurers are requiring greater cost sharing from patients as a way to reduce low-value care and encourage patients to shop for low-cost providers.

How does your research contribute to the field?
We provide the first analysis of the prevalence of cash prices and their potential impact on insured patients. Specifically, we investigate the pattern and distribution of cash prices versus in-network negotiated prices for imaging services in the San Francisco Bay area.

What are your research's implications toward theory, practice, or policy?
We document large price dispersion across both private and cash prices, and estimate that privately-insured patients could save substantially by price shopping.

Introduction

A November 2019 executive order requires health insurers and hospitals in the United States to provide substantial information by January 2021 to improve price transparency.[1] Health insurers must disclose the prices they negotiated with in-network providers and provide enrollees with tools to estimate their out-of-pocket costs for all services; hospitals must post the prices they negotiated with each insurer and the amount they are willing to accept in cash from a patient for 300 "common shoppable services." A shoppable service is one that patients can schedule, such as the imaging tests that we examine in this paper. The objective of this policy is to

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facilitate consumer price shopping and foster greater price competition between providers.

We use a proprietary dataset of imaging services in the San Francisco Bay area to simulate the potential cost savings when a consumer observes both the price their insurer has negotiated with an imaging center for a specific service and the cash payment that center is willing to accept from the consumer in lieu of the negotiated insurance price. This is the first study to our knowledge that examines the potential savings from allowing privately-insured consumers to observe both in-network prices *and* cash prices, which will both be facilitated by the recent executive order.

Health care providers included in a private health insurer's network negotiate a service-specific fee/price schedule with each private insurer. The provider agrees to accept the negotiated price as the complete payment for the service, which is divided between the insurer and the patient, with the latter in the form of a deductible, copayment, and/or coinsurance. Rarely posted directly, most providers also have a cash price schedule for patients who have the wherewithal to ask and are willing to pay in full when they receive a service. Cash prices, which are almost always distinct and lower than the standard chargemaster rate or "list price" charged for each service, can be paid via cash, check, tax-advantaged health account, or credit/debit card.

Both privately-insured consumers and health providers have incentives to utilize cash prices. Consumers increasingly have substantial "skin in the game" in the form of high deductibles, copayments, and coinsurance rates. In 2019, for example, 30% of employees were enrolled in a high-deductible health plan (ie, a deductible of at least $1,400 for an individual policy or $2,800 for a family policy), up from 4% in 2006, according to a 2019 Kaiser/HRET Survey of Employer-Sponsored Health Benefits. A consumer who is likely to end the year below her deductible can save money if the cash price is lower than her insurer negotiated price. Consumers beyond their deductibles can also benefit if cash prices are lower than their required out-of-pocket payment.

Providers that offer low cash prices may be able to attract additional patients who expect to end the year below their deductible, are unwilling to wait for their insurer's prior approval process or are denied, or seek services outside of their insurance coverage. The latter situation is more likely to occur if insured consumers know the cash prices and the prices private insurers have negotiated with providers, and insurers provide incentives for consumers to price shop. Providers might be willing to accept a cash payment lower than the insurer negotiated price for an insured consumer if they prefer an instant fixed payment to a payment delayed for months with a possibility of reduction or rejection and administrative efforts. Physicians get paid by an insurer about 40 days after providing care, on average, and spend an estimated $68 000/year per physician on administrative costs associated with interacting with insurers.[2]

Existing price transparency studies have not examined cash prices; they typically focus on what happens, or could happen, if privately-insured consumers observe the prices their health insurers negotiated with in-network providers. The empirical evidence is mixed. Studies document that substantial variation in negotiated prices across providers implies that there are large potential savings if consumers could observe prices before choosing a provider,[3,4] especially if consumers with a high-deductible health plan shift to a lower-priced provider.[5] In practice, providing consumers with price information reduced spending by 13% to 17% by directing consumers to lower-priced providers and increasing provider price competition.[6,7] However, 2 other studies[8,9] find no impact of price transparency on spending, and 1 finds a surprising increase in spending.[10]

The most common explanations for the ineffectiveness of price transparency tools are that most consumers are not aware of nor use price transparency tools,[5,8,11-13] patients tend to abide by their referring provider's recommendation,[4] and few consumers realize that prices vary for providers within their private health insurance network.[11] However, health care prices are, finally, becoming more transparent. In addition to the executive order described above, the Center for Medicare and Medicaid Services has posted charge and payment information for all physician and hospital services in recent years; several states are developing all-payer claims data bases; start-up companies such as Castlight Health, non-profit organizations such as Minnesota Health Scores, and certain states (eg, New Hampshire) post the prices that providers accept from private health insurers for specific procedures.

Our study contributes to the literature of price transparency by examining cash prices as a new channel for cost savings. None of the existing studies consider the new option—cash prices—for insured patients to reduce medical spending. We focus on imaging services because they are common, often moderately expensive, have relatively homogeneous quality across providers, and customers usually have time to price shop. First, we compare cash and insurance prices for the same service at the same imaging facility and find that about 60% of cash prices are set below the corresponding in-network insurance prices. We then estimate that privately-insured patients could save up to 22% of their in-network prices if they pay the lower of the 2 prices for a service at a given facility. Although we do not model a dynamic general equilibrium, the savings could be even larger than we estimate if providers respond to customers' use of cash prices by cutting those prices. Finally, we estimate savings if consumers observe cash and insurance prices at all facilities and choose the facility in the county or region with the lowest price. We find that the service-volume weighted average cost saving for a privately insured patient can be as high as 47% if she shops within her county and takes advantage of the cash prices.

Table 1. Sample Statistics.

Facility-service-level data

	N	Mean ($)	Median ($)	SD ($)	Min ($)	Max ($)
Medicaid price	6818	245.6	105.1	283.4	15.6	2027
Medicare price	7595	262.4	238.8	215.6	26.2	817.5
Private 1 price	7811	511.8	285.0	824.7	2.9	10674.1
Private 2 price	7811	489.9	310.2	703.8	23.0	10674.1
Private 3 price	7811	527.3	317.3	723.3	23.1	10674.1
Private 4 price	7811	439.0	308.9	677.2	23.1	10674.1
Private 5 price	7811	489.5	329.9	735.3	23.1	10674.1
Cash price	7811	528.4	365.0	1127.1	30.0	10000.0

Consumer's insurance benefits and use of in-network medical care

1/1/2015-12/27/2015	Individual policies (n = 700)			Family policies (n = 556)		
	Mean ($)	SD ($)	Range ($)	Mean ($)	SD ($)	Range ($)
Deductible	996	1188	0-6600	2106	2391	0-13200
Out-of-pocket maximum	3349	1636	0-8850	6761	3333	0-15000
Deductible remaining on 12/27, *conditional on a positive balance*	1022	1272	8.2-6316	1556	1556	0-15000
% with deductible remaining		63.3			73.4	

Data and Descriptive Analysis

We use a unique dataset developed by Stroll Health by assembling claims data, cash prices, and private and public payer fee schedules for the San Francisco Bay Area for imaging services. Stroll Health is a San Francisco-based company that helps consumers and physicians search for a patient's required out-of-pocket cost for imaging services at local imaging facilities. The raw data are acquired from web scraping payer sites, medical claims, and by asking facilities for their fee schedules and cash prices.

The dataset includes information on how much Medicaid, Medicare, and 5 major private insurance companies reimburse for 194 radiology procedures (Current Procedural Terminology, or CPT, codes) to 142 imaging facilities during 2014 to 2016. The data are bundled at the procedure level, grouping professional, technical, and other modifiers into a single price. The unit of observation is a price for a service at an imaging facility. Our final sample includes facility-service pairs with all 5 private insurer prices and cash prices available. Those facilities provide over 70% of imaging services available in the market.

The private insurance prices are the in-network allowed amounts that consist of the patient's required payment plus the insurer's payment to the provider. Table 1 reports descriptive statistics. Medicare and Medicaid prices, which are set rather than negotiated, are much lower than the private insurance prices in this market.

The 5 private insurers in the sample collectively covered 42.4% of the commercially-insured population in the area according to data from AIS Health's Directory of Health Plans for January 2014. The market shares ranged from 1.6% to 17.0%. The only major health insurer in Northern California not included is Kaiser, an insurer integrated with health providers that covered 48.1% of the commercially-insured population in January of 2014. The 5 insurers cover about 82% of the non-Kaiser commercially-insured population. Figure 1 indicates the distribution of imaging facilities in the sample by county.

We use benefit data from Stroll Health to determine the percentage of people who ended a year without exhausting their deductible. This dataset has information on insurance benefits and use of medical services for 753 people under age 65 who were covered by 1 of the 5 private insurers in the sample throughout 2015, and for 556 families with a family policy from 1 of these insurers. A consumer who has exhausted her deductible will have an incentive to pay the cash price if it is less than her copayment or coinsurance rate, or her insurer provides incentives to do (ie, by crediting her expenditure).

Method: Simulations

We perform 3 simulations to estimate how much patients and insurers could save if all prices were transparent. In the first simulation we assume that 1 privately-insured patient arrives at an imaging facility for a service and pays the lesser of the in-network price or the imaging facility's cash price. We report the level and percentage of savings relative to the in-network price, separately for each of the 5 private insurers. The patient saves nothing if the cash price exceeds the in-network price, and saves the difference between the in-network price and the cash price when
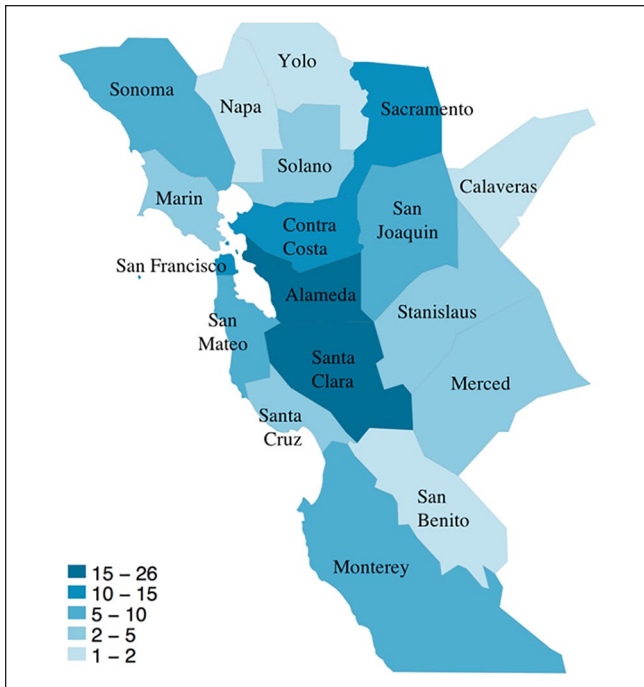
Figure 1. Distribution of imaging facilities in the Greater San Francisco Bay Area.

the latter is smaller than the former. We aggregate the savings by placing a weight on each facility type (ie, hospital-based versus a freestanding physician office) —service pair based on the volume of imaging services for California Medicare patients in 2014.

For simulation one, we report an upper-bound and a more conservative savings estimate to account for patients' incentives to price shop. The upper-bound estimate is likely to be achieved if: (1) patients can observe in-network prices and cash prices; and (2) insurers credit a cash price toward the person's deductible and share savings when a patient is beyond her deductible. In this case, patients have both the information and incentives to price shop. In a more conservative scenario, patients are only willing to search for and use lower in-network prices or cash prices if they actually ended the plan year below their deductible.

This lower-bound situation is likely to occur where: (1) providers sometimes stipulate that if a patient pays the cash price she agrees not to submit the claim to her insurer, in order to prevent the discount from being extended to all enrollees covered by the patient's insurer, and to satisfy the insurer's requirement to collect a copayment in order to channel patients to in-network providers[14]; and (2) insurers do not provide incentives for patients who are beyond their deductible to shop for lower prices.[7] The inability to pay cash prices and then seek reimbursement from their insurer weakens the incentives for consumers to pay cash prices because doing so often displaces the insurer's payment, thereby saving money for their insurer but not for themselves.

We calculate the more conservative savings as a proportion of the upper-bound estimates using the proportion of enrollees who do not exhaust their deductible by the end of the year. By the end of the year, 63% of the enrollees with an individual health insurance policy did not exhaust their deductible, and 73% with family policies did not exhaust their family deductible (Table 1). Among the patients who ended the 2015 plan year without reaching their deductible, the mean deductible balance was $1022 for individual policy members, and $1556 for enrollees in a family policy. The actual savings could be lower than the conservative estimate if prices are not transparent or consumers do not believe they will recoup the savings from price shopping. Conversely, the actual savings may exceed the conservative estimate if patients respond to "spot prices" —the price of care on the date of a service based on the person's current deductible, cost sharing requirements, and prior use. That is, patients may search for lower prices today even though it only saves their insurer money but not themselves by the end of the year. Recent studies show that patients place considerable weight on spot prices.[5,15]

In simulations 2 and 3, we assume that patients price shop in a geographic region, instead of comparing prices offered by a given facility. In the second simulation we estimate how much patients and private insurers could save if patients were treated by the facility with the lowest in-network price within the patient's county. We report results separately for a situation where a patient is willing to travel further and searches for the lowest-price facility in the entire Bay Area. In simulation 3 we estimate how much patients and private insurers could save if patients were treated by the imaging facility with the lowest price (in-network price or cash price) within either their county or (separately) the Bay Area. This simulation is relevant if an insurer provided patients with both the in-network and cash prices at each facility. The actual savings in the second and third simulations would be smaller if consumers believe the quality of imaging services differ meaningfully between facilities and if travel costs are substantial.

The simulations are modeling exercises and not statistical estimates. Therefore, rather than reporting confidence intervals, we conduct sensitivity analyses to explore the robustness of the estimated savings. Specifically, for each imaging service we omit the 2 facilities in a county that offer the lowest price, repeat the simulation procedure, and compare the savings from the baseline simulation to the version restricted to higher-priced providers. As we show below, the results in the latter versions are close in magnitude to the baseline simulations.

Results

Variation in In-Network Negotiated Prices Across Facilities

There is substantial price dispersion in negotiated in-network prices and cash prices across imaging facilities for the same
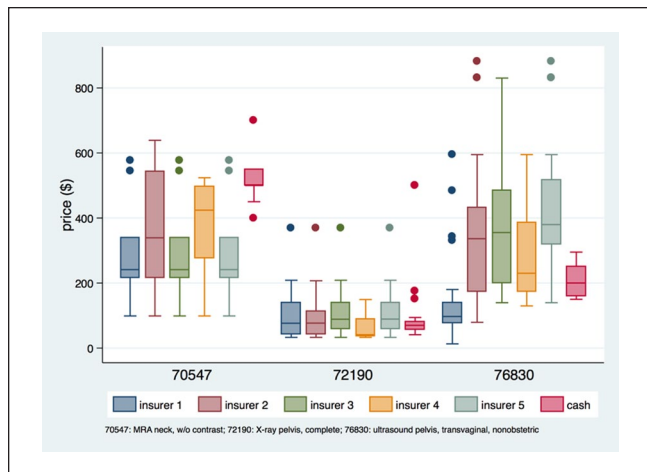
Figure 2. Variation of in-network prices and cash prices.

service. For 3 common imaging services, Figure 2 displays prices across facilities separately for the in-network prices with 5 private insurers and cash prices. The bottom and top of the rectangular boxes refer to prices at the 25th and 75th percentiles; the horizontal line in the rectangle indicates the median price across the facilities; and the horizontal lines outside of the boxes the 5th and 95th percentiles. For private insurer 2, for example, the median price for a neck MRA without contrast (CPT code 70547) is $339, whereas the prices range across facilities from $217 to $544 at the 25th and 75th percentiles. Patients could save a substantial amount of money if they observed the full set of in-network prices, were willing to travel, if perceived quality was similar across facilities, and insurers could determine how to share savings with patients.

For the 3 procedures depicted (Figure 2), the median cash price is sometimes higher than the median private prices, sometimes similar, and sometimes lower (ie, CPT code 70547, 72190, 76830, respectively). For all 3 procedures, the distribution of cash prices is tighter than for private prices.

Comparing Cash Prices to In-Network Private Insurance Prices

In Figure 3 we compare cash to in-network negotiated prices for each service-facility observation, separately for each of the 5 private insurers. Cash prices are measured on the x-axis and in-network prices on the y-axis. Observations below the 45° line are situations where an imaging facility charges a higher cash price than they accept from a private insurer (vice versa). Across all facilities, services, and private insurers, the cash price is less than the average of the 5 private insurance prices 57.6% of the time. In these situations, the cash price is $203 less than the private price, on average, or 31.2% less than the private price. Conversely, in the other 42.4% of instances, the cash price is $362 higher

than the private price on average, or 74.4% higher than the private price.

Savings When Patients Pay the Lesser of the Cash Price or the In-Network Private Price

In simulation 1 (Table 2), we assume that, for each imaging service and each of the 5 private insurers, 1 patient arrives at an imaging facility in the Bay Area that provides that service and pays the lesser of the in-network price their health plan has negotiated or the imaging facility's cash prices. Across the 5 private insurers, patients could save between $40 and $96, on average, or 10.1% to 22.2% of their insurer's in-network price. This includes instances where the facility's cash price is greater than the in-network price, and thus there is no savings. We also ran a simulation where patients do not observe prices ahead of time and adopt a strategy to ask for and always pay the cash price at an imaging facility. Always paying the cash price produces total spending that is fairly close to always paying the in-network price, consistent with the data displayed in Figure 3.

Savings When Patients Pay the Lowest In-Network Price in the County or Bay Area

In simulation 2 (Table 2), we estimate how much patients and private insurers could save if patients were treated by the imaging facility with the lowest in-network price within the county where they live, or in the entire Bay Area. In this simulation, consumers do not observe cash prices. Across the 5 private insurers, patients who are willing to travel within their county could save between $130 and $203 per service, on average, or 27% to 42% of their insurer's in-network price. Potential savings are larger if patients are willing to search for, and travel to, the lowest-priced imaging facility in the San Francisco Bay Area. Specifically, the estimated savings per service would be between $191 and $280, on average, or between 45% and 64% of their insurer's in-network price.

Savings When Patients Pay the Lowest In-Network or Cash Price in the County or Bay Area

In simulation 3 (Table 2), we estimate how much patients and private insurers could save if they were treated by the facility with the lowest price (in-network or cash price) within the county where they live, or the Bay Area. When the market is defined as the entire Bay Area, there is little difference in the savings between the second and third simulations. When patients are willing to price shop across a broad area, the opportunity to use cash prices in addition to in-network prices does not significantly increase the potential savings. However, if patients only search within their county, adding cash prices to the choice set does increase potential savings. Patients can save about an extra $20 per service
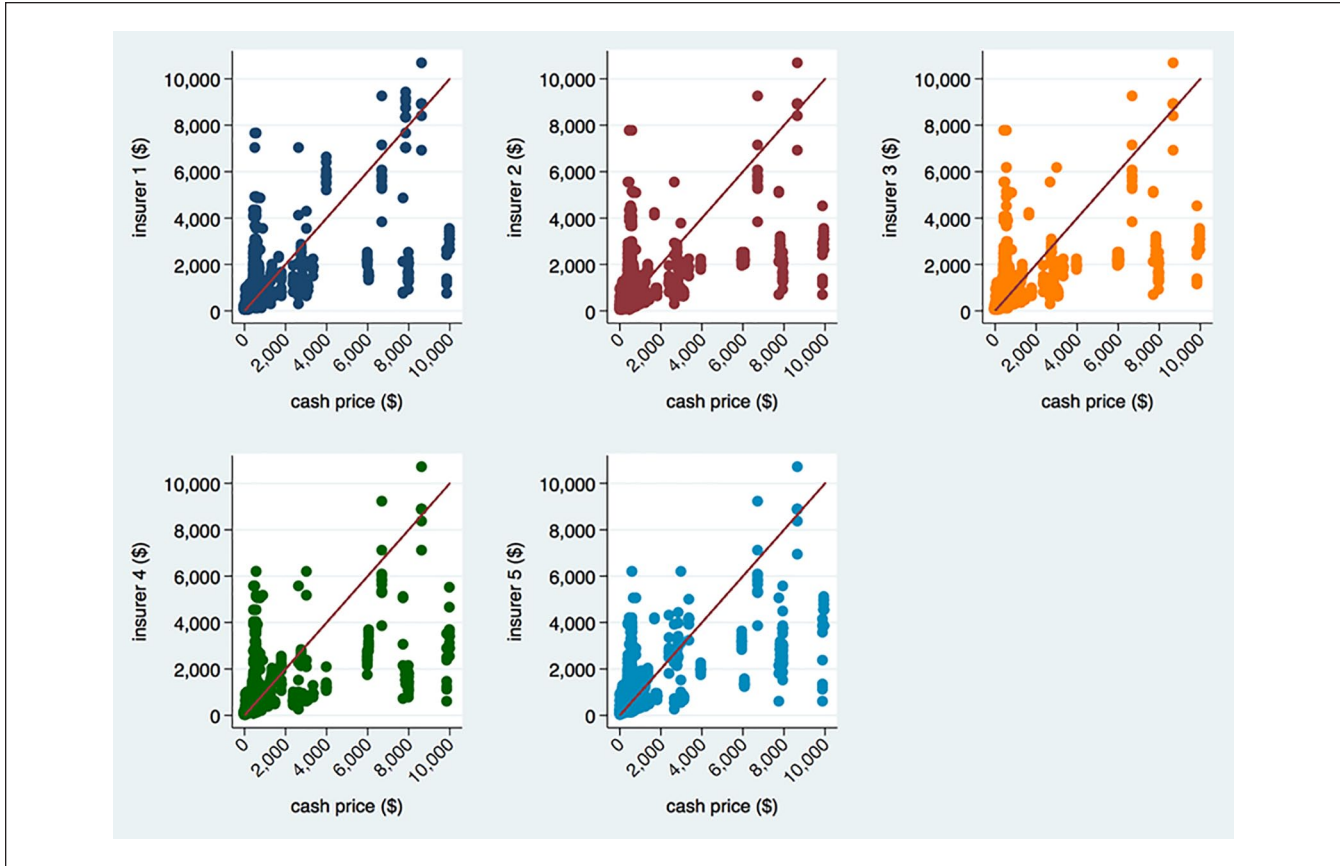
Figure 3. Comparison of private prices versus cash prices, at the procedure-facility level.

Table 2. Simulation: Patients Pay the. . .

1: Lesser of the Cash Price or the In-Network Private Price.

	Saving measures	Insurer 1	Insurer 2	Insurer 3	Insurer 4	Insurer 5
Upper-bound	Per service ($)	58	77	96	40	81
	As % of in-network price	15.0	18.1	22.2	10.1	21.5
More conservative	Per service ($)	37	49	61	25	51
	As % of in-network price	9.5	11.5	14.1	6.4	13.6

2: Lowest In-Network Price in County or Bay Area.

	Saving measures	Insurer 1	Insurer 2	Insurer 3	Insurer 4	Insurer 5
County	Per service ($)	172	178	203	130	182
	As % of in-network price	38.3	37.0	41.5	26.5	39.5
Bay Area	Per service ($)	258	257	280	191	280
	As % of in-network price	64.%	58.8	63.0	45.4	63.2

3: Lowest In-Network or Cash Price in County or Bay Area.

	Saving measures	Insurer 1	Insurer 2	Insurer 3	Insurer 4	Insurer 5
County	Per service ($)	184	194	220	147	212
	As % of in-network price	41.7	40.8	46.9	30.8	46.7
Bay Area	Per service ($)	259	258	283	196	284
	As % of in-network price	64.1	59.1	63.9	46.8	64.0

when searching for the lowest in-network or cash price (simulation 3) versus the lowest in-network price only (simulation 2) in a county. With traffic in the Bay Area, a trip from Oakland to San Francisco often takes more than an hour, and a trip from San Francisco to San Jose often takes over 2 h. It seems unlikely, therefore, that a patient would traverse the entire Bay Area to save this amount. The more conservative savings estimates for all 3 simulations, where only patients who expect to end the year below their deductible are willing to pay cash prices, are 63.3% of the upper-bound savings.

Sensitivity Analysis

For each simulation, we test the sensitivity of the results to excluding the 2 lowest price providers (specific to each imagine service) in each county or the Bay Area as a whole. We use the unweighted average of the 5 private prices and the cash price to measure the price level for each facility-service. We then omit the 2 lowest-priced facilities for each service in each county and repeat the 3 sets of simulations. Supplemental Table A1 reports the results. In simulation 1 the cost savings are actually slightly higher in the restricted simulation than the baseline simulation. In simulation 2 the estimated cost savings are about one-third lower in the restricted simulation when consumers shop within a county, but are slightly larger in absolute terms (but a smaller percentage of the baseline prices) when consumers are willing to shop within the Bay Area. The most interesting sensitivity analysis involves simulation 3. Even after omitting the 2 lowest priced providers, consumers are still able to save a similar amount in percentage terms, although lower in levels, when they shop based on both cash prices and private prices in a county or the Bay Area. Overall, the sensitivity tests demonstrate that the baseline results are not being driven by a few providers willing to accept low private prices or offer low cash prices.

Discussion

We find large saving opportunities in imaging services, given the large price dispersion in cash and private prices. About 60% of cash prices are set below the corresponding in-network private prices. We estimate consumers could save up to 22% of their insurer's in-network price by paying cash at the same facility for the same service if prices are transparent and insurers determine how to create incentives for consumers to price shop. This baseline estimate is similar in magnitude to studies that estimate the savings associated with price shopping across facilities based on in-network prices. The potential savings are much larger (455-64% of the in-network price) if a patient shops over both in-network and cash prices within a county.

Providing consumers with information on cash prices provides potential savings about 3-5% beyond those involving in-network prices only, if 1 restricts the available

imaging centers to those in a consumer's county. Although our analyses focus on the San Francisco Bay Area, the results offer a glimpse of the potential national impact of the executive order effective in January 2021 that requires hospitals nationwide to post cash prices for 300 common shoppable services. As high deductible plans continue to grow, paying in cash may present a significant savings opportunity for both patients and insurers.

In addition to offering an opportunity to reduce medical spending, cash prices might also expand access to and reduce inequities in health care. A recent survey documented that non-white patients were more likely than white patients to compare costs between potential medical providers before selecting a provider. The same pattern was true for patients with relatively little education and income relative to their counterparts.[13]

Policymakers and payers should examine legislation, rules, and contracts that inhibit providers from offering and patients from using cash prices. The current limited understanding of the cash market in health care also provides promising business opportunities for organizations to create and adopt technologies that can expedite the search and comparison of cash and private prices.

There are some limitations. First, we estimate cost savings from price-shopping across facilities without accounting for consumers' travel costs and indirect costs such as the opportunity cost of a person's time. Modeling travel costs is difficult given the housing patterns and proliferate travel options in the Bay Area. Second, we assume that quality is the same across facilities. This is reasonable since radiology services are fairly homogenous, but there may be unobserved quality differences. Third, our analyses take the listed prices as given and focus on short-run cost savings. In the long-run, if private and cash prices become more transparent, providers may respond by changing the composition of their service network and pricing strategies. In the absence of better data, our analysis offers a first step to understand the understudied cash market.

Authors' Contributions

J.E.: conception and design; acquisition of data; drafting and revising the manuscript, S.N.: conception and design; analysis and interpretation of data; drafting and revising the manuscript, L.X.W.: conception and design; analysis and interpretation of data; drafting and revising the manuscript, K.H.: drafting and revising the manuscript, and S.A.: acquisition of data.

Ethical Approval

The project was approved by Cornell University's Human Subjects committee.

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Supplemental Material

Supplemental material for this article is available online.

References

1. HHS.gov. Trump administration announces historic price transparency requirements to increase competition and lower healthcare costs for all Americans. U.S. Department of Health & Human Services website. Published November 15, 2019. Accessed August 10, 2020. https://www.hhs.gov/about/news/2019/11/15/trump-administration-announces-historic-price-transparency-and-lower-healthcare-costs-for-all-americans.html
2. Casalino L, Nicholson S, Gans D, et al. What does it cost physician practices to interact with health insurance plans? *Health Aff*. 2009;28(4):533-543.
3. White C, Ginsburg P, Wu H, Reschovsky J, Smith J, Liao K. *Healthcare Price Transparency: Policy Approaches and Estimated Impacts on Spending*. West Health Policy Center; 2014.
4. Chernew M, Cooper Z, Larsen-Hallock E, Morton FS. Are health care services shoppable? Evidence from the consumption of lower-limb MRI scans. National Bureau of Economic Research. 2019. Acessed July 16, 2019. https://www.nber.org/papers/w24869
5. Brot-Goldberg Z, Chandra A, Handel B, Kolstad J. What does a deductible do? The impact of cost-sharing on health care prices, quantities, and spending dynamics. *Q J Econ*. 2017;132(3):1261-1318.
6. Whaley C, Schneider J, Pinkard S, et al. Association between availability of health service prices and payments for these services. *J Am Med Assoc*. 2014;312(16):1670-1676.
7. Lieber E. Does it pay to know prices in health care? *Am Econ J Econ Policy*. 2017;9(1):154-179.
8. Desai S, Hatfield L, Hicks A, et al. Offering a price transparency tool did not reduce overall spending among California public employees and retirees. *Health Aff*. 2017;36(8):1401-1407.
9. Whaley C, Brown T, Robinson J. Consumer responses to price transparency alone versus price transparency combined with reference pricing. *Am J Health Econ*. 2019;5(2):227-249.
10. Desai S, Hatfield LA, Hicks AL, Chernew M, Mehrotra A. Association between availability of a price transparency tool and outpatient spending. *J Am Med Assoc*. 2014;315(17):1874–1881.
11. Schleifer D, Silliman R, Rinehart C. Still searching: how people use health care price information in the United States, New York State, Florida, Texas, and New Hampshire. *Public Agenda*. April 6, 2017.
12. Mehrotra A, Brannen T, Sinaiko AD. Use patterns of a state health care price transparency web site: what do patients shop for? *Inquiry*. 2014;51:0046958014561496.
13. Mehrotra A, Dean KM, Sinaiko AD, Sood N. Americans support price shopping for health care, but few actually seek out price information. *Health Aff*. 2017;36(8):1392-1400.
14. Muir M, Alessi S, King J. Clarifying costs: can increased price transparency reduce healthcare spending? *William Mary Policy Rev*. 2013;319-366.
15. Abaluck J, Gruber J, Swanson A. Prescription drug use under Medicare Part D: a linear model of nonlinear budget sets. *J Public Econ* 2018;164:106-138.