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Employer risk-adjustment transitions with inertial consumers: Evidence from CalPERS

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Abstract

Risk-adjustment policies, which transfer money from insurers with healthy consumers to those with sick consumers, are an important tool to contend with adverse selection in health insurance markets. While the steady-state properties of risk-adjustment have been studied extensively, there is less evidence on the transition phase of policy implementation. We study the introduction and removal of risk-adjustment at California Public Employees' Retirement System and show that these changes meaningfully impact premiums via plan differences in enrollee health status. Despite these premium differences, there is limited consumer resorting due to consumer inertia, though new active enrollees respond more fluidly. We show that, with inertial consumers, risk-adjustment changes have substantial distributional consequences, leading to worse outcomes for sicker consumers when removed and vice-versa when implemented. We estimate a model of plan choice with premium sensitivity, brand preferences, and inertia and use these estimates to study the interaction between risk-adjustment policies and the strength of inertia.

KEYWORDS

adverse selection, inertia, risk-adjustment

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1 | INTRODUCTION

A key goal of policy in managed competition health insurance markets is to set up an environment where consumers have a range of options that best match their underlying tastes (see, e.g., Enthoven et al., 2001). Large employers in the United States typically share this objective when establishing plan menus for employees to choose from. Consumers can extract value from plan choice by choosing an option that best matches their needs for risk protection, medical providers, and overall cost. When functioning properly, a well-curated menu coupled with active consumer choice can add substantial value for an employee population, relative to an environment with no plan choice (see, e.g., Abaluck & Gruber, 2016; Handel & Ho, 2021).

There are several key issues that employers must contend with when setting up a plan menu. First, it is well known that adverse selection can be a major concern in health insurance markets when sicker consumers heavily sort into specific plans, driving up the premiums for those plans and, effectively, reducing the number of choices for healthier consumers (Akerlof, 1970; Einav et al., 2010). Adverse selection has distributional implications as well as efficiency implications, often harming sicker consumers more than healthier consumers. While in many contexts the actual extent of adverse selection is muted by either preference dimensions that are not directly correlated with health risk (Einav et al., 2020) or by choice frictions (Handel, 2013; Handel et al., 2019), in some employer contexts adverse selection has caused the market for some options to completely unravel (Cutler & Reber, 1998). Employers and policymakers have several policies at their disposal to mitigate adverse selection including risk-adjustment transfers that transfer money from insurers enrolling healthy patients to those enrolling sick patients (Geruso & Layton, 2020). While risk-adjustment transfers are conceptually straightforward to implement, in practice it is difficult for employers to implement them effectively due to logistical reasons (e.g., gaming by insurers and setting up data infrastructure, Brown et al., 2014).

Second, in addition to the concern of adverse selection, employers and regulators are typically concerned about the ability of consumers to make effective and active choices from large plan menus. There is now a substantial body of research documenting choice difficulties, including choice frictions that occur when actively engaged in the choice process (e.g., Bhargava et al., 2017; Handel & Kolstad, 2015) as well as frictions that occur when consumers have a default option each year and, consequently, exhibit choice inertia and do not actively engage in a plan choice (e.g., Ericson, 2014; Handel, 2013; Ho et al., 2017; Polyakova, 2016). In addition to the important consequences these choice frictions have for maximizing consumer utility given a set of plan options, they have important interactions with adverse selection and policies to mitigate that selection, for example, risk-adjustment transfers. While some prior papers have studied these interactions (e.g., Handel, 2013; Polyakova, 2016), there is limited empirical work investigating their consequences in a specific empirical context with relevant policy changes (e.g., to risk-adjustment transfers).

In this paper, we study the impact of adding and removing risk-adjustment transfers at the California Public Employees' Retirement System (CalPERS). CalPERS administers health and retirement benefits on behalf of more than 3000 public schools, local agencies, and State employers in California. CalPERS offers a number of different health plans, typically around 10, including three PPO plans (since 2008) and at least three HMO plans (since 2008). Recently, CalPERS administers health benefits for approximately 1.5 Million beneficiaries across the state of California each year. In this study, we use detailed data on plan choice and plan utilization from CalPERS spanning 2008–2020. The data include information on (i) health insurance plan characteristics, (ii) plan choices, (iii) individual-level claims data for all beneficiaries in all plans, and (iv) beneficiary demographics. This data set and context provide an excellent opportunity to study plan choices, adverse selection, and risk-adjustment transfers on a large scale.

Crucially for our analysis, in 2014 CalPERS implemented a risk-adjustment transfer policy with the goal of mitigating adverse selection into certain plans by setting up transfers between insurers based on their enrollees' health risk. We document how, as expected, this policy change led plan premiums to decrease for plans enrolling sicker consumers and vice versa for plans enrolling healthier consumers. Despite meaningful premium changes, we find limited evidence of consumer choices responding in kind, due primarily to consumer inertia. In 2019, CalPERS discontinued its risk-adjustment transfer program, leading to substantive premium increases for plans enrolling sicker consumers and vice-versa for plans with healthier consumers. Similarly, since consumers continued to have their previously chosen plan as a default option, the consumer choice response to these large premium changes was limited. Thus, overall, while risk-adjustment was effective in removing the linkage between plan enrollee health risk and plan premiums, there was only a limited demand response to the resulting plan premium changes. As a result, the in-sample efficiency benefits of risk-adjustment transfers were likely quite small, even though the distributional implications, via the large premium changes, were substantial.

The remainder of the paper unpacks the implications of the interaction between consumer inertia and risk-adjustment transfers. Specifically, we investigate (i) the distributional implications of risk-adjustment transfers in the presence of inertia and (ii) the implications of risk-adjustment transfers in counterfactual environments with reduced consumer inertia. While in the observed environment, with inertia, plan migration is limited after meaningful premium changes due to risk adjustment, in counterfactual analyses with reduced inertia consumer sorting could be much more active, leading to potentially quite different implications for plan enrollments, plan costs, and consumer benefits (both overall and for specific types of consumers).

To study these issues, we leverage the detailed data we possess to estimate a structural model of health plan choice in the CalPERS environment. The model focuses on the period 2015–2020 with the goal of closely studying the removal of risk-adjustment transfers from 2018 to 2019. The CalPERS plans have limited differentiation in terms of cost-sharing but more substantial differentiation in terms of provider networks. Consequently, we model choice as a function of (i) plan premiums (ii) a consumer inertia parameter, and (ii) plan fixed effects interacted with consumer health risk. For the latter, we use the Johns Hopkins ACG software to estimate projected individual health risk and spending for the upcoming year using a past year of claims and spending data at each yearly choice point. This flexible framework combines preferences for provider networks, any differences in cost-sharing, and other plan brand preferences into a fixed effect that is estimated as a function of health risk. Though not the focus of this paper, it is possible to decompose these fixed effects into components related to cost-sharing differences (minimal), specific providers who are in a given network, and brand preferences. Here, we use the fixed effect as a positive estimate of plan preferences (as a function of health status) and perform counterfactual analyses under the assumption that plan fixed effects as a function of health status are unchanged by (i) risk adjustment-policies and (ii) reduced inertia.[1]

[1]We also present and discuss a specification from 2018 to 2020 that separates out projected individual-level plan-specific out-of-pocket expenses structurally from this plan fixed effect.

We estimate the model for the time period 2015–2020 and do so separately for new enrollees only with active choice and all enrollees grouped together. The estimates for these two samples are similar, suggesting that our main specification does a good job of separately identifying inertia from other plan-specific unobserved preferences (see, e.g., Abaluck & Gruber, 2022; Handel, 2013; Ho et al., 2017; Marone & Sabety, 2022 for other papers that use this strategy to identify inertia separately from persistent unobserved preferences). In the main specification, the inertia term is large, suggesting that, on average, consumers leave substantial sums of money on the table by remaining in their default plan and not moving to a new option (a typical finding in the literature, Chandra et al., 2019).

We perform several robustness checks for the model, finding similar results in specifications where we (i) restrict the time period to 2018–2020 and (ii) also explicitly include coefficients on plan cost-sharing features and individual-plan-specific projected out-of-pocket costs, separated out from the plan X health status fixed effects. In addition, we implement an IV specification to deal with potential time-varying premium endogeneity, finding similar results to our baseline specification.

We use the model estimates to answer several key questions. First, we investigate the distributional implications of removing risk-adjustment transfers for 2019. We begin with a focus on the nest of three PPO options, whose premiums were most affected by risk-adjustment and who have limited provider differentiation. On average, premiums increased for both sick and healthy consumers in this nest due to the removal of risk-adjustment, but by much more so for sicker consumers ($735) than for healthier consumers ($374). The worse distributional implications for sicker consumers are due to the facts that (i) they are more likely to enroll in generous PPO coverage and (ii) that these plans experienced larger premium increases after the removal of risk-adjustment transfers.

For all plans at CalPERS taken together, the results are more muted, due in large part to the significant horizontal differentiation among the HMO options and across the HMO and PPO options. The premiums for sicker consumers increase by more on average than those for healthy consumers (mean change of $6 for sicker consumers, −$96 for healthy consumers; median change of −$105 for sicker consumers, −$168 for healthy). Interestingly, overall, the distributional consequences of risk-adjustment removal are relatively muted for sicker consumers relative to healthier consumers, because there is meaningful sorting of both sick and healthy consumers across plans before the removal of risk-adjustment. This is likely due to the fact that the plans are differentiated primarily based on network rather than cost-sharing: if CalPERS plans were instead differentiated based on cost-sharing, it is likely that sorting would be more acute (as found in other papers with vertical plan designs, e.g., Handel, 2013, Marone & Sabety, 2022) and that, consequently, the removal of a policy like risk-adjustment transfers would be worse for sick versus healthy people, as we see in the nest of PPO options.

These findings show that (i) sicker consumers chose the PPO plans relatively more, (ii) these plan premiums go up more when risk-adjustment is removed as a result, and (iii) healthier consumers who pool with sicker consumers in the PPO plans also pay significantly higher premiums. Thus, a healthy consumer with a preference for a broad PPO network, pooling with sicker consumers, also pays much higher premiums when risk-adjustment is removed. Conversely, a sicker consumer in an HMO is more likely to pool with healthier consumers on average and not be as negatively impacted by the removal of risk-adjustment.

Next, we simulate a version of the choice model with no inertia (inertia parameter = 0) and find that this improves the impact of removing risk-adjustment for sicker consumers relative to healthier consumers. In the counterfactual with no inertia, consumers sort directly to the plan they most prefer in the new environment without risk-adjustment. This implies meaningful share shifts towards plans with premiums that have become relatively lower over time (less generous PPO, Anthem HMO) away from plans whose premiums have become relatively higher over time (more generous PPO, Kaiser).

We find that, with this active resorting after the removal of risk-adjustment, sicker consumers are able to substitute away from plans with higher premiums rises and, as a result, the impact of removing risk-adjustment is more equitable in our context without inertia, with minimal differences between the premium changes for sick versus healthy consumers on average. This is true even though plan market shares change substantially in this scenario. In an environment with inertia, when risk-adjustment transfers are removed, the sick experience higher premium increases than the healthy (especially in the nest of PPO options) while in an environment without inertia, the ability of the sick to fluidly resort almost entirely removes the negative distributional consequences of removing risk-adjustment transfers.

It is important to note that these results are partial equilibrium results and rely on plan premiums being held fixed at their observed 2018 and 2019 values. If we had a model where premiums readjust dynamically in the environment with no inertia, it is possible that over time sicker consumers would be meaningfully worse off as the premiums for the plans they are in rise further to reflect the higher average cost of those plans' risk pools. This is a potentially valuable topic for future research on the impacts of policy transitions in health insurance markets.

The rest of the paper proceeds as follows. Section 2 discusses the setting and data. Section 3 discusses the risk-adjustment policy change and associated descriptive results. Section 4 presents our demand model and Section 5 presents our counterfactual simulations comparing the impact of the risk-adjustment policy change with and without consumer inertia. Section 6 concludes.

2 | SETTING AND DATA

CalPERS provides health insurance coverage to those who are employed by the California state and municipalities, as well as their dependents and retirees. With approximately 1.5 million enrollees, they are the second largest public purchaser of employee health benefits in the US Health insurance benefits are provided through a number of different plans from multiple insurers, including three PPO plans and several HMO plans. The plans differ in their cost, coverage, and care accessibility, and subscribers are able to choose from this wide range of plans.

As being one of the largest providers, health benefits provision by CalPERS has been studied on various dimensions, such as impacts of cost-sharing (Chandra et al., 2010), insurer competition (Ho & Lee, 2017, 2019), and reference pricing (Robinson et al., 2017; Whaley et al., 2017; Zhang et al., 2017). Our study focuses on another dimension, the impact of risk adjustment.

2.1 | CalPERS risk-adjustment

To mitigate adverse selection, CalPERS implemented a risk-adjustment transfer program in 2014. The transfers between plans were determined by an adjustment model that CalPERS had set up to be consistent with industry best practices (CalPERS, 2021) and which was intended to be similar to the risk-adjustment methodology implemented by Covered California, the California ACA individual exchange (CalPERS, 2017).

The risk-adjustment program implemented during our study period had two primary phases where (i) CalPERS and insurance carriers negotiate "unadjusted" premiums based on total medical and pharma spending and an administrative services/fee component and then (ii) the medical and pharma component of premiums is adjusted based on the average population risk score, determined by an algorithm that predicts, ex ante, utilization rates for a given individual and then aggregates those scores at the plan level. If a plan had an aggregated risk score less than the population-weighted average then the medical and pharma spending component of premiums was adjusted upward (i.e., the insurer made net transfers out relative to actual costs) while the converse is true if the insurer had higher than average aggregate risk.[2]

CalPERS decided to discontinue this risk-adjustment program in 2019, just 5 years after its implementation. CalPERS noted that this termination was due to the complexity of determining individual/plan risk-scores and plan difficulties in understanding/responding to those key fundamentals (CalPERS, 2017). The implementation and removal of risk-adjustment within a single environment over time provides us with a unique opportunity to observe the effects of risk-adjustment implementation and removal holding other factors relatively constant.

2.2 | Member sample construction

We analyze health care claims data from CalPERS over a 13 year period of time between 2008 and 2020, for non-Medicare consumers. Our data consists of three major components: (1) member-level enrollment information for all CalPERS subscribers which includes plan choice and basic demographics; (2) complete line-level healthcare claims with information on diagnoses, procedures, providers, and spending; and (3) plan details consisting of cost-sharing details including deductibles, copays, and maximum out-of-pocket spending as well as some network-related information. This data is similar in content to other detailed data sets used recently in the health insurance literature, such as those in Brot-Goldberg et al. (2017), Einav et al. (2010), Gruber et al. (2020), and Handel (2013).

We construct our primary analysis sample at the subscriber-year level—we condense our claims data to yearly subscriber spending, further separated into discrete parts such as outpatient, inpatient, and pharmacy spending to calculate predicted out-of-pocket spending; information on the original size of our sample is in Supporting Information: Appendix Table A1. We add risk scores calculated by the Johns Hopkins Adjusted Clinical Groups (ACG) Case-Mix System as an indicator of predicted next-year health status for each family. This risk-score has been used extensively in prior research (see, e.g., Handel, 2013) and generates predictions of expected future spending at the individual-level using a medically motivated statistical model. For members in a household, we calculate the average ACG risk score for each subscriber. Since past data is unavailable for the new subscribers, we use concurrent ACG risk scores, which are calculated based on information from the current year, for this group.

[2]In principle, it is possible that when insurers negotiate the administrative services component of premiums with CalPERS, they do so with the interaction between the risk-adjustment program and consumer inertia in mind. We do not study this negotiation process but note that (i) the medical and pharma spending component of premiums is much larger than the administrative services component and (ii) our analysis shows large treatment effects of the risk-adjustment program on consumer-facing premiums.

For our primary analysis, we make several sample restrictions. First, we omit all subscribers who have missing data (3% of remaining subscribers dropped, primarily from missing zip codes), as well as all subscribers enrolled in smaller plans or plans significantly different from the usual HMO and PPO options (6% of remaining subscribers dropped). We are left with subscribers in the 14 health insurance plans listed in Table 1. The table shows the number of plan subscribers for each plan over the timespan of our data. Kaiser has the most substantive market share, enrolling approximately 50% of subscribers in 2019, while Blue Shield HMO plans and CalPERS-funded PPO options make up the majority of the remaining share. These 14 plans are not present through all the years of our analysis—the Anthem plans, Health Net plans, Sharp, and UHC entered the market in 2014; WHA entered in 2018; Blue Shield Trio entered in 2020; and Blue Shield NetValue was discontinued in 2017, with individuals defaulted into the Blue Shield Access + plan. Cost-sharing details for the single tier on each of the 12 plans that were active in 2019 are presented in Table 2.

The nature of differentiation in the CalPERS options is unusual: most large plan menus have more meaningful differences in financial cost-sharing across the plans.[3] As we see from Table 2, there is very little differentiation in cost-sharing characteristics across plans in the CalPERS market. For most HMOs there is no coinsurance and a small copay for office visits or inpatient visits; for the three PPOs (PERS Select, PERSCare, and PERS Choice) there is a deductible ($500 for the PERS Care and PERS Choice plans; $500–$1000 for the PERS Select plan).[4] Postdeductible, PERS Select and PERS Choice have 20% inpatient coinsurance rates while PERSCare has a 10% rate, before reaching the plan-specific out-of-pocket maximums. Generally, copays and coinsurance are the same regardless of coverage tier while deductibles and out-of-pocket maximums are doubled for the 2-party and family tiers. The fact that there is minimal cost-sharing differentiation but meaningful network differentiation motivates our demand modeling approaching based on plan X health status fixed effects.

Table 3 presents some high-level descriptive statistics for our overall sample as well as for the year 2019. In 2019, there were almost 500,000 subscribers and almost 1.2 million members. Forty-two percent of subscribers cover only themselves, and roughly 36% cover 3+ family members (including themselves). At the family level, mean health care spending is $14,189 with a median of $3794 and 95th percentile of over $54,000.

2.3 | Premium contributions

Total premiums (for both the benficiary and CalPERS) for this sample range between $356.50 and $3469.39 per month for 2019. Premiums are set for state employees on a statewide basis depending on the plan and number of covered dependents. The plans subscribers are offered and the networks for a given plan are both regionally determined. Premiums are constructed

[3]We note especially that, in our environment, Kaiser enrolls approximately 50% of CalPERS beneficiaries over our sample period. Kaiser is known to have a different medical delivery model though, in our context, limited cost-sharing differences relative to other options. We note that in 2023, Kaiser had an aggregate risk score of 0.925, where the population average is 1 CalPERS (2022). Overall, Kaiser's presence here suggests that risk-adjustment transfers may have a more muted overall impact, because there are limited transfers into or out of the largest insurer.

[4]PERS Select has a value-based insurance design with a deductible that varies from $500 to $1000 for single subscribers. This is examined in more detail in Hua (2022).

TABLE 1 Total subscriber plan enrollment by year

Plan	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Anthem HMO Select	—	—	—	—	—	—	4499	10,997	13,536	13,534	11,390	15,970	18,297	18,298
Anthem HMO Traditional	—	—	—	—	—	—	3638	5654	8181	6721	6635	7447	6418	6418
Blue Shield Access+	107,442	108,894	108,668	97,417	88,043	79,980	75,183	70,293	65,202	71,917	74,719	56,270	41,871	41,871
Blue Shield NetValue	40,012	44,708	52,189	59,248	65,619	71,804	81,085	60,215	35,942	—	—	—	—	—
Blue Shield Trio	—	—	—	—	—	—	—	—	—	—	—	—	3340	3340
Health Net Salud y Mas	—	—	—	—	—	—	337	1336	1797	2895	4088	4509	4555	4555
Health Net SmartCare	—	—	—	—	—	—	268	460	5882	15,334	8194	11,469	7958	7958
Kaiser	164,186	172,514	182,959	189,078	193,452	194,572	193,979	208,159	219,756	234,331	241,235	249,117	238,063	238,063
PERS Choice	82,707	85,183	88,886	88,477	87,802	78,594	71,667	72,263	66,932	62,574	59,379	58,385	54,363	54,366
PERS Select	2365	3733	5529	9012	12,919	22,825	19,424	17,816	20,678	23,267	25,244	34,999	37,533	37,534
PERSCare	9860	10,070	8966	7632	6198	5194	11,070	12,916	13,053	13,700	16,877	12,548	10,842	10,842
Sharp	—	—	—	—	—	—	657	3370	4149	4442	4919	5486	5633	5633
UHC Alliance HMO	—	—	—	—	—	—	2686	9609	20,754	29,578	30,340	31,769	32,554	32,555
WHA	—	—	—	—	—	—	—	—	—	—	2608	4373	4594	4594

TABLE 2 Single-tier plan cost-sharing characteristics (2019)

Plan	Deductible	Office copay	Inpatient coinsurance (%)	Brand drug copay	Generic drug copay	MOOP
Anthem HMO Select	$0	$15	0	$20	$5	$1500
Anthem HMO Traditional	$0	$15	0	$20	$5	$1500
Blue Shield Access+	$0	$15	0	$20	$5	$1500
Health Net Salud y Mas	$0	$15	0	$20	$5	$1500
Health Net SmartCare	$0	$15	0	$20	$5	$1500
Kaiser	$0	$15	0	$20	$5	$1500
PERS Choice	$500	$20	20	$20	$5	$3000
PERS Select	$1000	$10	20	$20	$5	$3000
PERSCare	$500	$20	10	$20	$5	$2000
Sharp	$0	$15	0	$20	$5	$1500
UHC Alliance HMO	$0	$15	0	$20	$5	$1500
WHA	$0	$15	0	$20	$5	$1500

TABLE 3 Sample demographics: nonmedicare subscribers

	All years total	2019 only
N—Subscribers	6,438,491	492,342
N—Subscribers and members	14,753,569	1,127,061
Subscriber % female	56.11%	55.51%
Age (subscribers)		
<30	39.58%	41.03%
30–54	32.75%	32.39%
55+	27.67%	26.57%
Family size		
1	41.44%	42.26%
2	23.10%	21.81%
3+	35.46%	35.93%
Subscriber allowed spending		
Mean	$11,063.65	$14,188.99
25th percentile	$801.47	$1132.95
Median	$2853.57	$3794.22
75th percentile	$8582.96	$11,017.52
95th percentile	$42,598.05	$54,672.08
99th percentile	$128,842.40	$164,831.10

with three tiers: a single tier, a 2-party tier that pays double the single premium, and a family tier that pays 2.6 times the single premium.

A crucial factor in consumer choice of plans is the premium contribution that they have to pay. As a general heuristic for CalPERS, an "80–20" rule can be used to approximate premium contributions where each subscriber pays 20% of the premiums; however, we use more precise calculations on how premium contributions are set based on information on employee status and bargaining units to model each subscriber's contribution for each plan in their choice set. Importantly, though beneficiaries pay 20% on average, they typically pay close to the full marginal price of more expensive plans. Our precise beneficiary premium contribution calculation is described in the Supporting Information: Appendix. In the Supporting Information: Appendix, we also provide complete information on the premiums for single enrollees (Supporting Information: Figure A3) and on the premiums for families (Supporting Information: Figure A4).

3 | IMPACT OF RISK-ADJUSTMENT

Risk adjustment transfers are a well-known policy tool used to mitigate adverse selection in health insurance markets. These transfers move money from plans that enroll healthier consumers to plans that enroll less healthy consumers, based on algorithms that map ex ante claims to risk scores and, ultimately, to expected spending in a benchmark plan. These transfers slow down or stop adverse selection death spirals by dampening the link between enrollee costs and plan premiums that is inherent to insurance markets and other selection markets.

Our small-group market setting provides a unique opportunity to empirically study the impact of risk adjustment on premiums and enrollment with the presence of inertia. Unlike in the individual market, here there is no need to disentangle the effects of risk-adjustment transfers from those of other policy instruments like premium subsidies, reinsurance, and the individual mandate tax penalty. Furthermore, the introduction of risk adjustment in 2014 and removal in 2019 provide a natural experiment to observe the health plan choices of beneficiaries who are previously enrolled in a plan and are not required to make active choices year-to-year, setting the stage for potential inertia.

Risk-adjustment transfers operate by taking transfers from insurers enrolling healthier consumers and giving them to insurers enrolling sicker consumers. This then filters into plan premiums by removing (or weakening) the link between premiums and costs: if the insurer receives a transfer for enrolling a sicker consumer, the costs they incur for that consumer are lower, allowing premiums to in turn be lower. See Glazer and McGuire (2000) for a conceptual presentation of the role of risk-adjustment in health insurance markets with adverse selection and see, for example, Cutler and Reber (1998), Handel et al. (2015, 2019), and Geruso and Layton (2020) as examples of other papers studying risk-adjustment concepts.

While we do not observe the exact formula that CalPERS used to implement its risk-adjustment transfers during our sample period, our upcoming analysis illustrates that the implementation of the program had a meaningful impact, as intended, lowering the premiums for plans enrolling sicker consumers and raising the premiums for plans enrolling sicker consumers. See Section 2.1 for more details on the implementation and removal of risk-adjustment at CalPERS.

3.1 | Risk adjustment: Impact on premiums, enrollment and costs

First, we show that risk-adjustment transfers led to significant premium changes (shown in monthly dollars) for some plans in the CalPERS choice set. Figure 1 presents, for each plan, premiums for single enrollees over time. The red lines indicate the start of risk-adjustment (in 2014) and the end of the program (for benefits year 2019). As discussed in our description of employee premium contributions above, employees typically pay close to the full marginal costs of more expensive plans in sample relative to cheaper plans. Given this, for parsimony, we present total premium changes, which are very similar to those faced by beneficiaries.

Several large impacts on premiums are notable. Of the three self-insured PPO options (PERS Care, PERS Select, and PERS Choice), two had large premium changes due to risk-adjustment program changes. The most generous PPO option, PERS Care, had a single-tier premium decrease of over $4000 at the start of the program in 2014, and an almost $2000 increase in the single-tier premium after the program ended. Note that this implies the family premiums for this plan decreased by over $9000 in 2014 and increased by over $5000 in 2019.

Conversely, PERS Select, the less generous PPO option, had an approximate $1300 premium increase after the risk-adjustment program started in 2014, and an approximate $1600 premium decrease after the program ended in 2019. Taken together with the premium changes for PERS Care, these plans had huge changes in relative premiums at both the onset and ending of CalPERS' risk-adjustment program.

Some other plans also had large premium changes due to risk-adjustment. When the program stopped for 2019, the Anthem HMO Traditional premium increased by almost $2000 for a single individual, while the Anthem HMO Select and Health Net Salud y Mas premiums

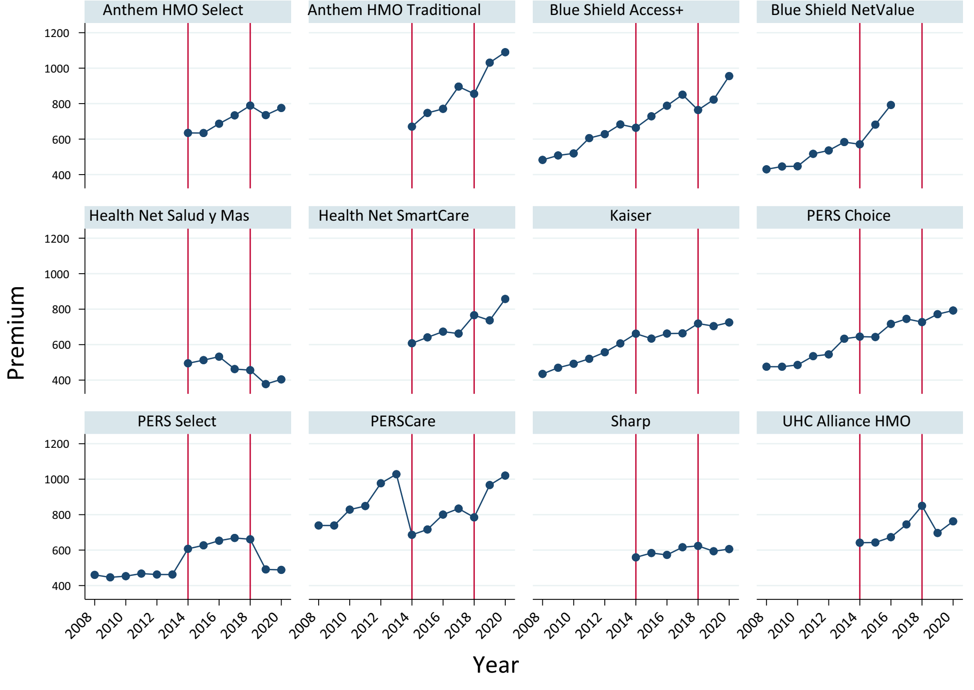

FIGURE 1 The monthly single-tier premiums over time, by health plan. This calculation includes both premiums paid by CalPERS and the subscriber [Color figure can be viewed at wileyonlinelibrary.com]

decreased by almost $600 per individual. Other plans had more muted premium changes, not indicative of any particularly large effect due to the start or end of the risk-adjustment program. Supporting Information: Table A2 in the Online Appendix presents the exact year-to-year premium changes for each plan and each year in our sample.

Next, to verify that the impacts in question relate to the risk-adjustment program, we match up these premium changes with baseline plan by plan risk scores. Figure 2 shows average ACG risk scores for individuals enrolled in each plan over time. Notably, the PERS Care average risk score is the highest of all the plans, both in 2014 and over time, with individuals enrolling in that plan predicted to be approximately three times more expensive on average than people enrolling in PERS Select, which has the lowest average risk score of all the plans. The pattern accords exactly with the premium changes and the onset and ending of risk-adjustment: for the plan with the sickest enrollees, premiums went down heavily with the start of risk-adjustment and went up heavily with its end. The converse is true for the plan with the healthiest enrollees. Similar patterns exist for other plans that had premium changes due to risk-adjustment, such as the two Anthem HMO plans.

Figure 3 presents another look at the link between plan aggregated risk scores and plan premiums. The figure plots Tier 1 (single individual) premiums as a function of the average ACG risk score for all enrolled individuals (whether or not they are in Tier 1). We take this approach because risk-adjustment id performed on all members but premiums for different tiers (e.g., Tier 2, w/spouse, Tier 3 with family) scale directly as a function of Tier 1 premiums. The figure shows that plan premiums are meaningfully more responsive to aggregate risk scores in the era with no risk-adjustment, relative to the era with risk-adjustment. Though the relationship under risk-adjustment is not flat (e.g., premiums are not a function of health risk)

FIGURE 2 The ACG scores over time, by health plan [Color figure can be viewed at wileyonlinelibrary.com]

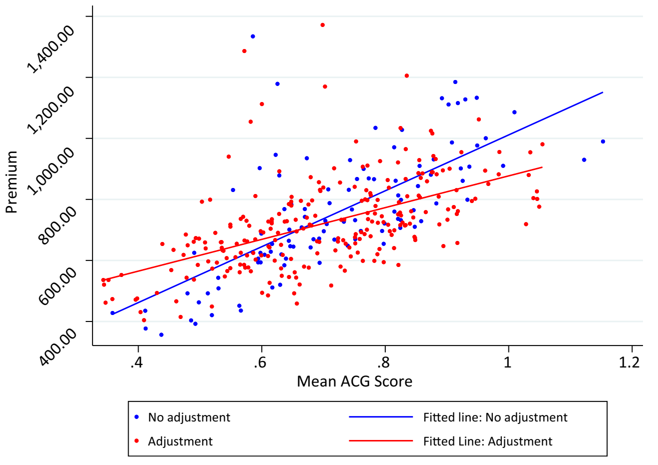

FIGURE 3 Tier 1 premiums and mean ACG scores within plan: 2015–2020 [Color figure can be viewed at wileyonlinelibrary.com]

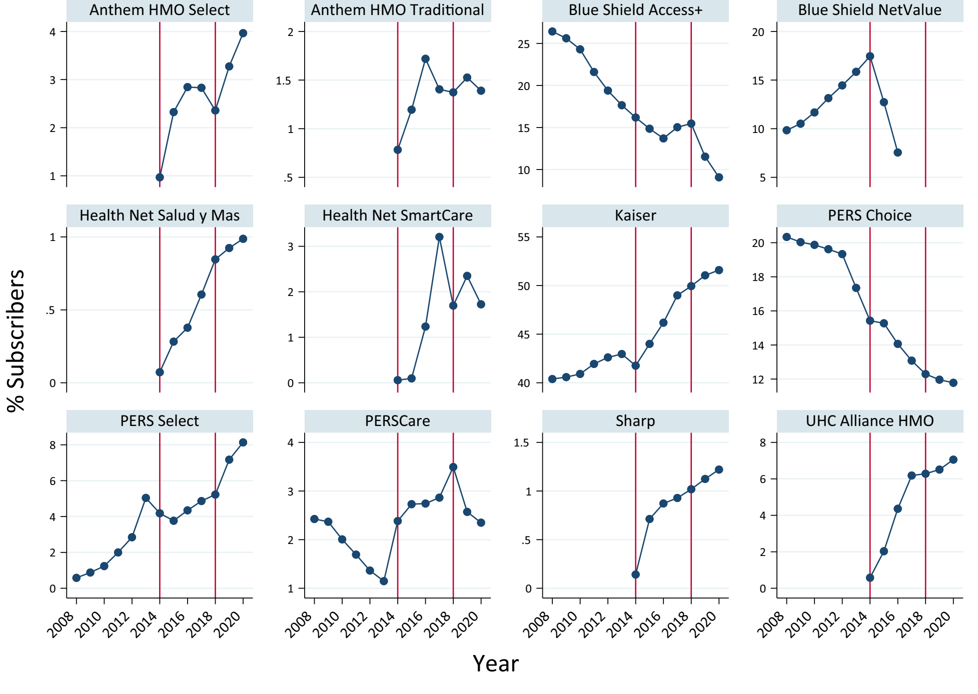

FIGURE 4 The plan enrollment probability over time [Color figure can be viewed at wileyonlinelibrary.com]

as one would expect under full risk-adjustment, this figure clearly shows that the risk-adjustment program is effective in decoupling premiums from health risk.

Figures 4 and 5, show enrollment and average actual plan spending over time. As expected, the large premium changes described above due to risk-adjustment do drive meaningful enrollment changes, though not as much as one would expect given the markedly different new value propositions of some of the plans. For example, enrollment in PERS Care increases and enrollment

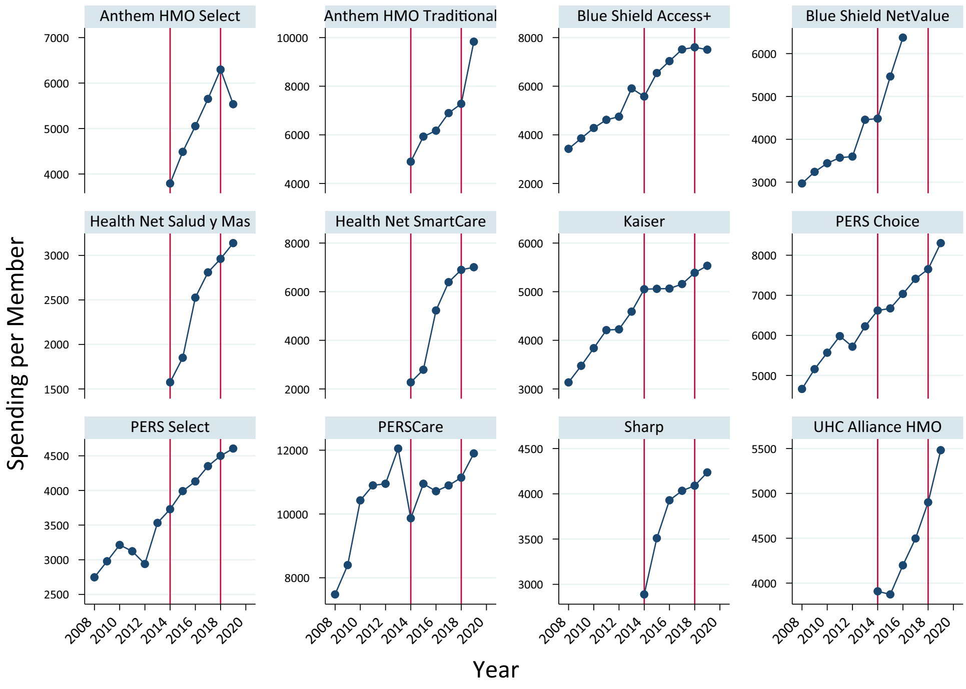

FIGURE 5 The spending per member over time, by health plan [Color figure can be viewed at wileyonlinelibrary.com]

in PERS Select decreases at the outset of risk-adjustment, and the reverse occurs when the program ends. Also, notably, as shown in Figure 5, the marginal enrollees for PERS Care at the outset of the program are quite a bit healthier than those already enrolled in the plan. This suggests that these are enrollees for whom a very generous plan option was attractive, but they did not want to choose it previously due to the high cost of pooling with sicker enrollees, a cost that was markedly reduced due to the onset of risk-adjustment.

Taken together, these descriptive results suggest that risk-adjustment (and its subsequent removal) had a significant impact on the premiums of several plans and that those impacts relate directly, as intended, to the health status of enrollees. Moreover, especially for the most generous PPO option, risk-adjustment allowed the migration of healthier marginal enrollees who likely wanted more generous coverage but did not want to pool with sicker enrollees before risk-adjustment. While these plan changes did lead to plan enrollment changes in the direction one would expect, given the price changes, the enrollment response is quite muted relative to what one would expect given the massive premium changes for some of the plans.

Given the relatively muted enrollment responses, we next investigate the enrollment responses over time of new enrollees who do not have a default option and thus are likely to have no inertia stemming from a prior plan choice. Figure 6 shows plan choice probabilities for new enrollees.

The evidence here is clear: new enrollees respond much more aggressively to the premium changes induced by risk-adjustment transfers. Large premium changes to the PPO options are met with much larger proportional enrollment responses by new enrollees. For example, when PERS Care has the big premium decrease at the beginning of the risk-adjustment program, enrollment increases by a factor of 2 for all beneficiaries but a factor of approximately 10 for

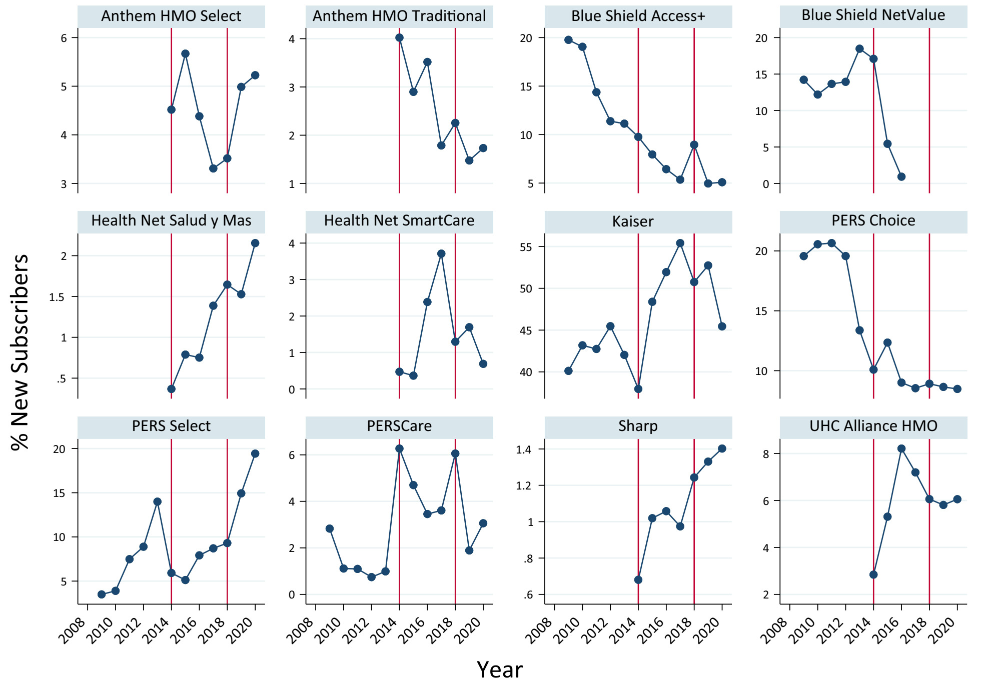

FIGURE 6 The plan enrollment probability over time for new enrollees [Color figure can be viewed at wileyonlinelibrary.com]

new enrollees. The figure illustrates similar results in line with the other large premium changes described above due to the onset or ending of the risk-adjustment program.

This suggests that inertia has a significant role in determining the impact of the risk-adjustment program in the CalPERS environment. To understand the role of inertia on risk-adjustment program impacts, notably its distributional impacts, we estimate a demand model and use it to investigate counterfactual policies that reduce inertia, leaving the rest of the CalPERS environment fixed.

4 | DEMAND MODEL

The core of our analysis is a choice model at the consumer level that investigates the value subscribers place on different plans, given their own underlying health. This model takes in data on choices made, plan options, plan characteristics, and consumer characteristics to estimate consumer preferences. We use this choice model to assess the key determinants of plan choice and plan migration for subscribers and then use our estimates of these determinants to study counterfactual policies such as alternative CalPERS plan menus.

We estimate two primary demand models. The first demand model we estimate is based on the following subscriber (family-level) utility specification:

$$U_{ij} = \alpha + \beta_1\mu_{ij} + \beta_2 P_{ij} + \beta_3 X_{ij} + \beta_4\xi_{ij} \times H + \beta_5\xi_{ij} \times S + \beta_6 1[j_t = j_{t-1}] + \epsilon_{ij}. \quad (1)$$

The model applies to each member i and plan j. μ_{ij} denotes the mean of member-specific expected health out-of-pocket spending in plan j. We quantify μ_{ij} empirically with two elements: (i) a projection of total consumer health spending and (ii) the impact of plan financial characteristics on out-of-pocket spending (e.g., deductible, coinsurance, out-of-pocket maximum). For (i), we use a simple model where the total spending projection is based on the prior year's spending for that subscriber, using the current year's spending if the prior year's spending does not exist.

P_{ij} denotes our estimate of the member contribution to their premium. X_{ij} reflects plan characteristics such as (i) network breadth, (ii) PPO or HMO status, and (iii) financial characteristics while ξ_{ij} reflects preferences for a specific insurer brand. Here the indicator variable H, equals one if a consumer is among the healthiest 70% of the sample as indicated by the ACG risk score (90% for the very poor health case), is interacted with ξ_{ij} to reflect potential health status-specific preferences for different insurers. S is a dummy for if a consumer is among the least healthy 30% of the population (10% for the very poor health case), according to the ACG risk score. Finally, $1[j_t = j_{t-1}]$ is an indicator variable if a given plan option is the same as a consumer's previously chosen plan. β_6 is thus a value of inertia, reflecting money consumers are willing to leave on the table above and beyond what they would if facing the choices fresh, in an active choice environment. ϵ_{ij} reflects unobserved idiosyncratic preferences for plan j, which we estimate using a logit error.

With the assumption of a multinomial error logit term, we transform this utility specification into the following standard multinomial logit regression equation:

$$1\left[j_t'\right] = \alpha + \beta_1\mu_{ij} + \beta_2 P_{ij} + \beta_3 X_{ij} + \beta_4\xi_{ij} \times H + \beta_5\xi_{ij} \times S + \beta_6 1[j_t = j_{t-1}] + \epsilon_{ij}, \tag{2}$$

where $1[j_t'] = 1$ if a subscriber chooses a given plan j' and 0 otherwise. We estimate the coefficients (α, β) using plan choice data and plan characteristic data. Specifically, we use the choices each subscriber could make in each year, the characteristics of those choices, and subscriber health and demographic information.

The key to our identification of the model parameters for plan preferences, separate from the inertia parameter β_6, is from comparing the choices made by new CalPERS members (who are active choosers) to existing members who have default options (their previously chosen plan) but who are otherwise similar (see Handel, 2013; Handel & Kolstad, 2015; Ho et al., 2017 for similar approaches).[5] We test the effectiveness of this approach by also estimating specifications on new enrollees only.

In addition to this demand model, we estimate a separate, simpler demand model that includes plan premiums and plan-by-health status fixed effects (which can later be projected on to plan characteristics). The primary reason we do this is that most plans in the data have similar cost-sharing characteristics, so there is not much variation in measurable plan-specific attributes, especially among the HMO plans. As a result, for our primary counterfactuals we think this more parsimonious model, which subsumes plan characteristics into the fixed effect, has better fit in-sample and is more reasonable to use for our out-of-sample counterfactuals.

[5]Note that we model health status at the time of plan choice for new enrollees using their contemporaneous/upcoming spending data, since that is the first data we have for those consumers.

This more parsimonious model is:

$$1\left[j_t'\right] = \alpha + \beta_1 P_{ij} + \beta \cdot \xi_{ij} \times H_{ACG} + \beta_3 1[j_t = j_{t-1}] + \epsilon_{ij}. \tag{3}$$

We implement this model with a logit error and four health status groups in the set H_{ACG}. These group are those families in the 0–50th percentiles of mean ACG score, those in the 50–70th percentiles, those in the 70–90th percentiles, and those in the 90–100th percentiles. Thus there is one estimated fixed effect for each plan and health grouping (which could be projected onto plan characteristics in a second state).

4.1 | Demand estimation results

Our first model estimates focus on the plan choices made by subscribers between 2018 and 2020. We present the results in Table 4 with two columns to separate the results by health status.

Both columns present a version of the model with out-of-pocket spending predictions, inertia, and plan-region-health status interacted fixed effects. The estimates illustrate that consumers have some degree of price sensitivity, but that inertia is quite high relative to that price sensitivity, generally swamping price changes that occur in-sample. Similarly, the plan by region by health status fixed effects are quite large, implying that sources of plan differentiation (e.g., networks, plan rationing modes, etc.) are quite important to consumer choice, which makes sense given that the plans in sample are differentiated primarily by networks rather than by cost-sharing.

Likely due to the collinear nature of the plan cost-sharing characteristics, it is hard to separately identify coefficients on the different plan cost-sharing characteristics. For example, for those in poor health, the predicted mean out-of-pocket coefficient is positive (wrong-signed) and the deductible coefficient is also positive. But, the predicted out-of-pocket standard deviation and maximum plan out-of-pocket coefficients are negative (as expected). This likely occurs because (i) there is limited variation in plan cost-sharing characteristics and (ii) when there is variation, these four characteristics vary together in the same direction.[6]

The results from the more parsimonious model are presented in Table 5, while we present estimates of plan fixed effects from the same model in the Supporting Information: Online Appendix, in Figure A1 for all enrollees and in Figure A2 for new enrollees. Plan fixed effects here subsume a number of plan-specific factors such as cost-sharing differences, network differences and brand preferences. Effects are presented relative to Kaiser, the plan with the largest in-sample market share.

[6]One can see this by looking at the total relative impact of all out-of-pocket related characteristics between two plans. For example, for a single individual, PERS Care has a maximum out-of-pocket of $2000, a deductible of $500 while PERS Select has a maximum out-of-pocket of $3000 and a deductible of $1000. So, if predicted out-of-pocket for a consumer is $1000 in Care, $1400 in Select, with standard deviation of $500 in the former and $800 in the latter, we can compute the relative impact of out-of-pocket exposure in one plan versus the other using the coefficients in Table 4. Given the above numbers, the contribution of out-of-pocket to PERS Care utility would be the equivalent of approximately $1350 dollars while for PERS Select this eqiuvalent would be $1650. There are two key takeaways. The first is that, when aggregated together, the coefficients related to out-of-pocket spending are negative as expected. The second is that for a relatively healthy consumer, given the large premiums differences between these two plans, PERS Select is much more attractive than PERS Care financially.

TABLE 4 All employees with health status based on ACG scores, 2018–2020

	With poor health	With very poor health
Observed plan selection		
Premium paid	−0.000180***	−0.000181***
	(0.00000139)	(0.00000138)
Predicted OOP mean	0.000192***	0.000276***
	(0.0000167)	(0.0000163)
Predicted OOP SD	−0.000146**	−0.000299***
	(0.0000482)	(0.0000475)
Deductible	0.000419***	0.000412***
	(0.0000160)	(0.0000160)
MOOP	−0.000287***	−0.000294***
	(0.0000106)	(0.0000106)
Plan × Region FE	X	X
Poor health × Plan × Region FE	X	
Very poor health × Plan × Region FE		X
Inertia	4.473***	4.474***
	(0.00446)	(0.00445)
Observations	13646945	13646945

Note: Standard errors in parentheses.
$^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

TABLE 5 Regression estimates predicting 2015–2020 plan choices

	All enrollees	New enrollees
Premium paid	−0.000196***	−0.000218***
	(0.00000103)	(0.00000269)
Inertia	4.454***	
	(0.00287)	
Plan × Region × Health fixed effects	X	X
Observations	31,887,213	2,505,807

Note: Standard errors in parentheses.
$^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

The effects are similar in the entire sample and for the new enrollee sample, suggesting they are well-identified separately from inertia in plan choice in the full sample. Of particular note, several plans that have very low market shares have very negative fixed effects, suggesting that choice of these plans is rationalized only by large logit error shocks. For plans with higher market shares, the values range from approximately −$1000 for PERS Select to approximately +$1000 for PERS Care and +$1500 for Blue Shield Access+.

Finally, as shown extensively in prior work such as Chandra et al. (2019), we find that inertia is very important in predicting year-on-year choices. Individuals are not likely to switch plans and, as a result, leave substantial sums of money on the table as plan options change year-to-year. Our estimate from Column (1) of Table 5 finds that people are willing to leave $4.454/0.000196 = \$22,724$ of additional premium on the table not to switch plans. Therefore, in line with previous expectations and research, we expect very limited natural plan switching.

4.1.1 | Robustness: Premium endogeneity

We note that, since our approach has plan-region fixed effects and a lengthy panel, we are not concerned with premium endogeneity at the plan X region level. However, one may still be concerned that there is a time-varying component of these plan-region effects and that this component may be involved in premium setting.

We address this concern in Supporting Information: Online Appendix A.2. To do this, we follow Berry (1994) and exploit the fact that contributions only take several values, that is, there is no individual-/small-group-specific pricing. We define "quasi-markets" as the set of enrollees who face the same set of prices, are in the same year, health status, region, and made the same decision in the previous year. Then, we use average Tier 1 premiums net of Kaiser premiums in the region over the sample period 2015–2020 to instrument for the premiums consumers actually face in each region, year, and scenario. This average premium should be uncorrelated with any time-varying premium endogeneity but correlated with actual premiums faced.

Supporting Information: Table A3 presents the results of this exercise alongside baseline model estimates. The results in the IV approaches that we investigate are similar to those in our main specification, suggesting that time-varying premium endogeneity is not a significant concern in our environment. Please see Supporting Information: Online Appendix A.2 for more details.

4.1.2 | Results with new enrollees

Table 5 also presents the estimate of premium sensitivity for the specification estimated with new enrollees only. The estimate for premium sensitivity is very similar in magnitude to that for the model with all enrollees (which accounts for inertia). This suggests that the primary specification with all enrollees is effectively identifying persistent stable preferences from inertia. The same is true for the estimates from the first model (structurally including out-of-pocket measures) with new enrollees only.

5 | COUNTERFACTUAL ANALYSIS: RISK-ADJUSTMENT AND INERTIA

In this section, we use our demand model estimates to investigate the consequences of CalPERS removing risk-adjustment on beneficiary plan choices, with and without the presence of inertia. We focus on the policy shift from 2018 to 2019, where risk-adjustment transfers are removed. Our primary analysis here compares two scenarios: (i) plan choices predicted by our model estimates with full inertia as estimated and (ii) plan choices predicted by our model estimates with no inertia present, holding fixed other parameter estimates. We use the estimates from the second, more parsimonious specification described in the last section for this exercise (Equation 3).

To implement the no inertia scenario, we set β_3 from Equation (3) to 0. To implement this, we take 2018 plan choices as given and set the parameter to 0 for choices made for enrollment year 2019. Of course, in practice, there are myriad policies that one could implement to reduce inertia and our model meaningfully simplifies the impact of such policies by presuming they are fully effective and by presuming that, in the full inertia environment, inertia operates as a switching cost driving a wedge between the incumbent option and alternative options. As discussed in depth in Handel (2013), Bhargava et al. (2017) and the literature survey by Chandra et al. (2019), there are many possible microfoundations related to inertia including (i) rational inattention (Ho et al., 2017), (ii) switching costs, (iii) product-specific capital/learning, (iv) random inattention, and (v) status-quo bias. Please refer to this literature for a more extended discussion of the potential micro-foundations for inertia. Here, we assume a simple specification, especially given that, under the presumption that inertia is fully removed, the consequences are likely to be quite similar under the different models relating to these potential microfoundations.

Table 6 presents the baseline enrollment and cost estimates for the predictions of the model estimated with full inertia. The top part of the figure presents projected enrollment and average medical costs by plan for 2018 and the bottom part presents these statistics for 2019, after the large premium changes induced by the removal of risk-adjustment. This table mimics what occurs in our data in practice and also showcases model fit relative to the actual statistics in sample (see Supporting Information: Figure A5 in the Online Appendix for the analogous table in-sample).

Table 7 presents the analogous model estimates with no inertia. While the complete impacts for each scenario are presented in Tables 6 and 7, we also present the non-Kaiser impacts of the shift from the full inertia to no inertia on plan enrollments in Figure 8 and the impact of this shift on plan health composition (by individual ACG quantiles) in Figure 7.

The differences in terms of market share changes, relative to the case with full inertia, are striking in terms of both enrollment and the selection profile of consumer risks. Key relative impacts of risk-adjustment, moving from the full to no inertia scenario, include:

- PERS Select: this is the least generous PPO option which had premiums move down meaningfully after the removal of risk-adjustment. With full inertia, enrollment in PERS Select increases slightly from 57,937 to 76,210. But, in the counterfactual scenario with no inertia, plan enrollment increases from the same baseline (57,937) all the way up to 148,452, an increase of over 150%. It is notable from the table that, even with this huge increase in enrollment post-risk-adjustment with no inertia, the health mixture of enrollees remains similar, with the plan still selecting in prmiarily healthy enrollees.
- PERS Care: this generous PPO option had its premium increase substantially post-risk-adjustment for 2019. Our predicted model with full inertia finds an enrollment change moving from 32,852 to 24,561 moving from 2018 to 2019. In the simulation with no inertia, average plan costs per member rise by approximately 10%. In the no inertia scenario, interestingly, enrollment in PERS Care goes from the same baseline (32,852) to 27,872. Thus, despite the premium increases to this plan from 2018 to 2019, no inertia relatively increases enrollment. While this seems surprising at first glance, this occurs because the no inertia scenario moves significant

TABLE 6 2018–2019 (risk adjustment discontinued): predicted enrollees with full inertia

Year	Anthem HMO Select	Anthem HMO Traditional	Blue Shield Access+	HealthNet Salud y Mas	HealthNet SmartCare	Kaiser	PERS Choice	PERS Select	PERSCare	Sharp	UHC Alliance	WHA
2018												
Number of members	26,181	14,307	173,885	9637	19,864	546,995	132,245	57,937	32,852	12,366	77,343	6718
Average total cost per member	$6299	$7283	$7602	$2962	$6900	$5390	$7653	$4500	$11,139	$4092	$4902	$5409
Average plan cost per member	$6017	$6966	$7323	$2807	$6593	$5245	$6766	$3890	$10,278	$3840	$4902	$5409
Enrolled members (%) by ACG score percentile												
0%–50%	53%	48%	40%	76%	50%	55%	44%	64%	38%	59%	54%	44%
50%–70%	19%	19%	22%	13%	20%	19%	21%	17%	20%	19%	20%	22%
70%–90%	19%	21%	24%	8%	20%	18%	23%	14%	25%	16%	18%	24%
90%–100%	9%	12%	13%	3%	11%	8%	12%	5%	17%	6%	8%	10%
2019												
Number of members	31,626	9989	155,370	10,802	20,835	566,662	124,981	76,210	24,561	14,451	80,836	10,738
Average total cost per member	$5892	$8227	$7543	$3212	$6347	$5628	$7953	$4734	$10,918	$4452	$5429	$5902
Average plan cost per member	$5639	$7914	$7247	$3043	$6063	$5473	$7078	$4069	$10,041	$4201	$5146	$5616
Enrolled members (%) by ACG score percentile												
0%–50%	54%	46%	41%	75%	49%	56%	44%	65%	36%	59%	53%	44%
50%–70%	19%	20%	22%	13%	20%	19%	21%	17%	19%	19%	20%	22%
70%–90%	18%	22%	24%	9%	20%	17%	23%	13%	26%	15%	19%	24%
90%–100%	9%	12%	14%	3%	11%	8%	12%	5%	19%	6%	8%	10%

TABLE 7 2018–2019 (risk adjustment discontinued): predicted enrollees with no inertia

Year	Anthem HMO Select	Anthem HMO Traditional	Blue Shield Access+	HealthNet Salud y Mas	HealthNet SmartCare	Kaiser	PERS Choice	PERS Select	PERSCare	Sharp	UHC Alliance	WHA
2018												
Number of members	26,181	14,307	173,885	9637	19,864	546,995	132,245	57,937	32,852	12,366	77,343	6718
Average total cost per member	$6299	$7283	$7602	$2962	$6900	$5390	$7653	$4500	$11,139	$4092	$4902	$5409
Average plan cost per member	$6017	$6966	$7,323	$2807	$6593	$5245	$6766	$3890	$10,278	$3840	$4625	$5409
Enrolled members (%) by ACG score percentile												
0%–50%	53%	48%	40%	76%	50%	55%	44%	64%	38%	59%	54%	44%
50%–70%	19%	19%	22%	13%	20%	19%	21%	17%	20%	19%	20%	22%
70%–90%	19%	21%	24%	8%	20%	18%	23%	14%	25%	16%	18%	24%
90%–100%	9%	12%	13%	3%	11%	8%	12%	5%	17%	6%	8%	10%
2019												
Number of members	70,131	17,016	98,600	22,520	45,868	431,016	102,172	148,452	27,872	23,623	102,115	37,676
Average total cost per member	$6505	$8013	$7073	$4276	$7504	$5628	$6998	$5378	$8727	$5080	$6455	$7795
Average plan cost per member	$6267	$6757	$6813	$4092	$7250	$5435	$6186	$4630	$7976	$4848	$6208	$7546
Enrolled members (%) by ACG score percentile												
0%–50%	48%	43%	43%	65%	41%	59%	45%	61%	36%	54%	46%	36%
50%–70%	21%	21%	22%	16%	22%	18%	21%	18%	20%	20%	21%	24%
70%–90%	20%	23%	23%	13%	24%	16%	22%	15%	26%	18%	21%	27%
90%–100%	10%	14%	12%	5%	13%	7%	12%	6%	18%	7%	11%	13%

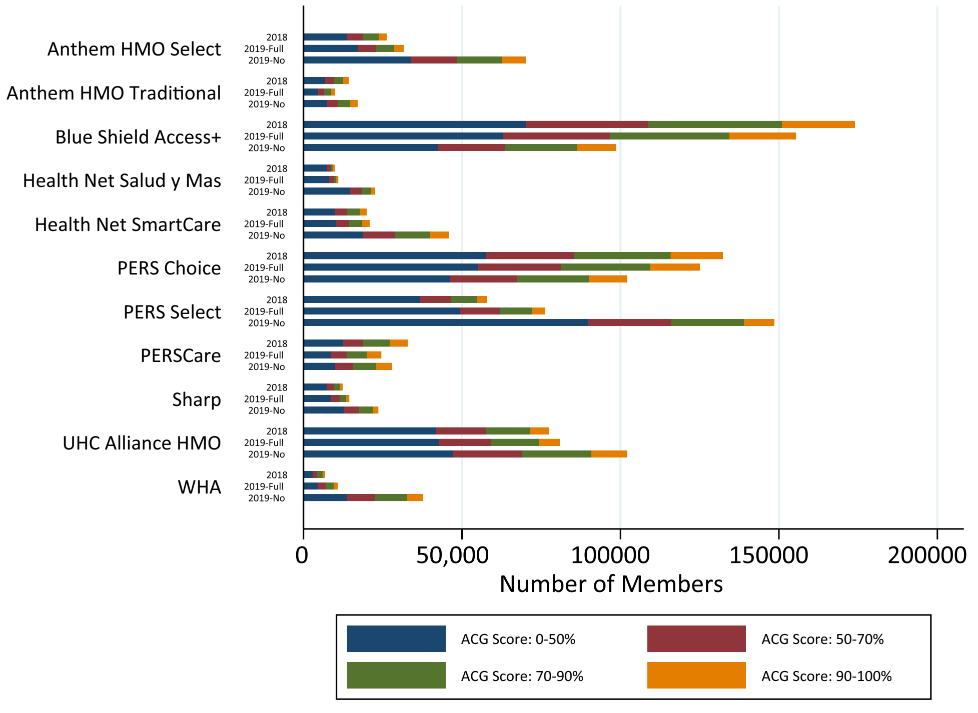

FIGURE 7 Plan composition: from 2018 to counterfactual scenarios in 2019, non-Kaiser [Color figure can be viewed at wileyonlinelibrary.com]

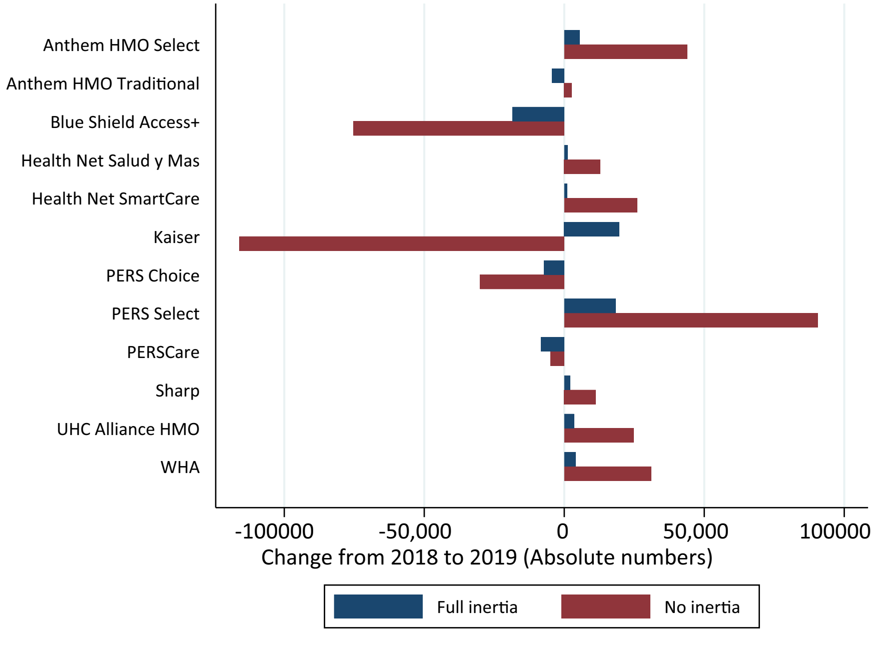

FIGURE 8 Change in number of enrollees: from 2018 to counterfactual scenarios in 2019 [Color figure can be viewed at wileyonlinelibrary.com]

market share (almost 100,000 beneficiaries) away from Kaiser, which has had plan cost rises over time. Thus, under no inertia, despite the premium rise for PERS Care, enrollment is higher than under full inertia. Notably, risk-selection into the plan is much better in the no inertia scenario, with expected member health costs decreasing by almost 30%.

- Kaiser: Kaiser has the largest enrollment by far in sample (with approximately 50% of enrollees). Under the full inertia scenario, the model predicts a slight increase in enrollment (about 4%). This turns into a large decrease under no inertia, with a predicted enrollment decrease of almost 100,000 beneficiaries (roughly 20%). As noted above, a key factor here is that Kaiser had premiums increasing in a meaningful way over the proceeding 5-year period so, under the no inertia scenario for 2019, a large amount of consumers move away from Kaiser who would have earlier in time if not for inertia.
- Anthem HMO Select: Anthem HMO Select also has a premium drop due to the removal of risk-adjustment. Under the full inertia scenario, plan enrollment increases slightly, while under the no inertia scenario it goes up markedly, almost tripling in number from approximately 26,000 to approximately 70,000. Risk-selection gets slightly worse under the no inertia scenario as riskier consumers on average select in.
- Other Plans: Tables 6 and 7 also describe the predicted changes for other plans. Blue Shield Access has meaningful drops in predicted enrollment for 2019 under the full inertia scenario and even bigger drops under the no inertia scenario. UHC Alliance HMO has a meaningful increase in enrollment under the no inertia scenario, with consumers substituting away from Kaiser towards that plan.

Taken together, these results suggest that inertia had a meaningful impact in muting the impacts of risk-adjustment policies. Specifically, these results show that PERS Select, who has meaningful premium decreases post-risk-adjustment, experiences a large increase in enrollment without inertia, relative to the change under full inertia. There is a similar, albeit smaller in scale, effect for the Anthem HMO Select plan. Though one would expect the increase in the PERS Care premium increase to lead to lower enrollment under the no inertia scenario, in our setting, the reverse is true because of the very large pent up potential switcher population in Kaiser. This pent up Kaiser potential switcher population magnifies and amplifies the effect of removing inertia on risk-adjustment for the plans with premium decreases (e.g., PERS Select) but mitigates the effect on plans with premium increases due to risk-adjustment (e.g., PERS Care).

It is worth noting that, when running the no inertia scenarios with new enrollees only, the enrollment predictions track what one would expect given the premium changes. This occurs because there is not a large pent up potential switcher population coming from Kaiser for new enrollees. As shown in Table 8, post-risk-adjusment the share of new enrollees choosing PERS Care, with the big premium increases, drops by almost 65%, and those choosing PERS Select increase by about 50%. This underscores that, ignoring the pent up potential switchers coming from Kaiser, the removal of risk-adjustment has stark effects on enrollment in the more and less generous PPO plans, in the expected directions.

5.1 | Distributional implications

In addition to assessing the enrollment changes and associated risk-selection, we also assess the distributional impacts of the removal of risk-adjustment, with and without inertia. Since

TABLE 8 2018–2019 (risk adjustment discontinued): new enrollees, no inertia

Year	Anthem HMO Select	Anthem HMO Traditional	Blue Shield Access+	HealthNet Salud y Mas	HealthNet SmartCare	Kaiser	PERS Choice	PERS Select	PERSCare	Sharp	UHC Alliance	WHA
2018												
Number of members	3237	1926	8131	1319	1134	40,864	8015	8327	5638	1073	5579	6718
Average total cost per member	$3200	$3815	$2982	$1470	$2148	$2465	$3244	$2291	$6925	$1661	$2675	$5409
Average plan cost per member	$3050	$3621	$2861	$1402	$2014	$2395	$2761	$1964	$6301	$1558	$2536	$5109
Enrolled members (%) by ACG score percentile												
0%–50%	71%	65%	72%	85%	73%	78%	70%	80%	51%	80%	74%	43%
50%–70%	13%	15%	15%	8%	13%	11%	14%	10%	19%	11%	13%	22%
70%–90%	11%	13%	10%	5%	10%	8%	11%	7%	19%	6%	9%	24%
90%–100%	5%	6%	4%	2%	4%	3%	5%	2%	12%	2%	4%	10%
2019												
Number of members	5361	1412	7125	1750	3140	34,199	7558	12,506	1973	1896	6805	2529
Average total cost per member	$3284	$3782	$2533	$1786	$3190	$2301	$2538	$2209	$4097	$2299	$2520	$3423
Average plan cost per member	$3175	$3668	$2424	$1703	$3080	$2220	$2112	$1781	$3679	$2189	$2416	$3308
Enrolled members (%) by ACG score percentile												
0%–50%	74%	71%	71%	84%	69%	82%	73%	81%	65%	76%	73%	62%
50%–70%	14%	12%	14%	8%	14%	10%	12%	11%	15%	12%	13%	18%
70%–90%	9%	12%	10%	6%	11%	6%	10%	6%	14%	9%	10%	14%
90%–100%	4%	5%	5%	2%	6%	2%	5%	2%	7%	3%	4%	6%

variation in cost-sharing among the plans studied is limited, we do this by focusing on the premium changes for different subscribers moving from 2018 to 2019 under the different scenarios investigated.

Figure 9 presents the results from this exercise. The bottom left panel presents change in annual premiums paid at the subscriber level. To start, we calculate this change assuming that members made the same choice in 2018 and 2019. The bottom right panel presents this premium change for subscribers in PPO plans only. Again, the change is calculated assuming that members made the same choice in 2018 and 2019.

The bottom right figure shows that consumers in the nest of PPO plans in 2018 experience meaningful premium increases on average (mean change of $490, median change of $572) including both for sicker consumers (mean change of $735, median change of $682) and healthier consumers (mean change of $374, median change of $544). The 75th quantile of premium increases for sicker ($1112) and healthier ($1099) consumers are quite large, though some portion of consumers do have premium reductions (20% overall) due to the premium drop-in PERS Select post-risk-adjustment removal. Moving to the next figure of all plans (bottom left), the figure shows a more muted overall impact on average (as one would expect with a change to transfers). With that in mind, post-risk-adjustment removal, the distributional impact is worse for sicker consumers, as expected, with 25th percentile, median, and 75th percentile premium changes of (−$439, $0, and $560) for sicker consumers but only (−$468, −$156, and $369) for healthier consumers. Thus, overall, the removal of risk-adjustment has redistributional consequences, raising premiums meaningfully more for sicker consumers than for healthier consumers.

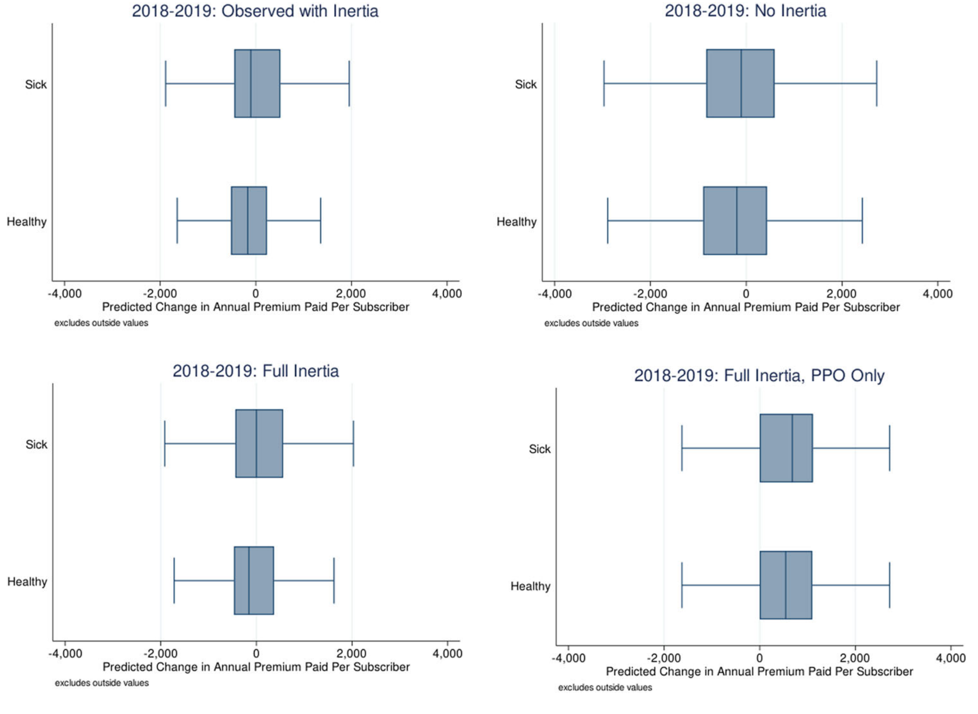

FIGURE 9 Impact of removal of risk adjustment: distribution of change in annual premium paid per subscriber in 2018–2019 [Color figure can be viewed at wileyonlinelibrary.com]

The top left panel presents the premium change based on the counterfactual choices in 2019 with inertia and observed choices in 2018. The top right panel presents the change in premiums based on the counterfactual choices in 2019 without inertia and observed choices in 2018. The top left panel shows that, with inertia, sicker consumers are worse off even after allowing choices to readjust post-risk-adjustment removal (mean change of $6 for sicker consumers, −$96 for healthy consumers; median change of −$105 for sicker consumers, −$168 for healthy). However, the panel with no inertia shows that, once consumers no longer have inertia and are able to adjust freely across plans, the distributional impacts are much more muted. Thus, once sicker consumers can fluidly readjust across the new plan landscape, they are able to select away from the plans that have been made more expensive due to the removal of risk-adjustment transfers. This is one additional reason for why, when implementing risk-adjustment transfers as a policy, policymakers should want to ensure fluid and active consumer decision-making to enhance the effectiveness of that policy.

6 | DISCUSSION

Adverse selection is omnipresent in health insurance markets, where health plan spending depends on the medical costs of enrollees. Risk-adjustment transfers, such as those implemented by CalPERS in 2014, are one important policy tool for regulators and employers to contend with this selection. Seminal work on risk-adjustment transfers focuses primarily on how those transfers can mitigate adverse selection conceptually (see, e.g., Cutler & Reber, 1998; Glazer & McGuire, 2000) but much of this work has not focused on how consumer and employer frictions interact with risk-adjustment transfers.

In this paper, we study the applied interaction between the CalPERS risk-adjustment transfers and consumer plan selection. Consumers exhibit substantial inertia and the big changes to the risk-adjustment program (coming online in 2014, offline in 2019) occur in a setting where consumers have a default option and have significant inertia. While recent work by Handel et al. (2019) notes that risk-adjustment and policies to reduce choice frictions are complementary, the CalPERS environment provides a real-world setting to study this interaction as policy unfolds.

We document how risk-adjustment transfers lead to big premium changes for certain plans, specifically those enrolling sicker or healthier enrollees relative to the average in-sample plan. Premiums for the most generous PPO option decrease substantially at the outset of the program and increase substantially when it sunsets. The reverse is true for the less generous PPO option. We show that, despite these large premium changes, few existing consumers switch between these plans, presumably due to inertia given. This is buttressed by the fact that new enrollees, who make active choices each year, do switch the plans they choose markedly in response to these large premium changes induced by risk-adjustment. This underscores the idea that, with lower inertia for existing consumers, plan choices would be more fluid and respond more effectively to the addition or removal of risk-adjustment transfers.

We estimate a model of plan choice, finding that brand preferences and inertia are quite important for explaining choices, even relative to premiums, reflecting in part the horizontal differentiation of many plans in the choice set at CalPERS. We apply this model to study how hypothetical policies that reduce inertia would impact plan choices when risk-adjustment ends at CalPERS for 2019. We find that, when many more consumers switch in an environment with reduced inertia consumers sort more heavily towards plans that are currently more attractive, that is, toward plans whose premiums have been decreased due to the end of risk-adjustment (those with healthier consumers on average). These more fluid choices closely resemble those made in-sample by new enrollees. We investigate the distributional consequences of removing risk-adjustment transfers and find that, in the environment with inertia as estimated, (i) enrollees in the nest of PPO plans and (ii) sicker enrollees lose out relative to their counterparts (HMO enrollees, healthier enrollees) when risk-adjustment ends. However, when inertia is removed and employees resort fluidly, these distributional consequences are heavily mitigated due to choice reoptimization.

The findings here present a case study for how policy implementation in practice can have different effects than classic insurance models predict. Specifically, in the presence of significant consumer inertia, policy changes that are intended to change market equilibrium through consumer reoptimization may be ineffective at generating that resorting and have unintended distributional consequences. As regulators and employers consider implementing policies such as risk-adjustment transfers in practice, they should consider not only the long-run, or steady state, impacts of those policies, but also how long it will take to transition to that new steady state and what the consequences will be for consumers in the meantime.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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