Pricing and Pass-Through in Response to Subsidies and Competition: Evidence From Medicare Advantage Before and After the Affordable Care Act*

Daria Pelech†
Congressional Budget Office

Zirui Song‡
Harvard Medical School

June 29, 2018

Abstract

After years of growth, payments to Medicare Advantage plans began to decline after the Affordable Care Act (ACA). The impact of this change in subsidies and the extent to which they are passed through to beneficiaries are unknown. We examined changes in plan behavior and enrollee benefits pre- and post-ACA by exploiting the variation in updates in federal payments to plans. We find a largely symmetrical change in plan bids and beneficiary pass-through in response to both increases and decreases in federal payments, suggesting that plans generally operate above cost. When the federal subsidy decreased after the ACA, plans reduced less salient benefits by a larger magnitude than they had raised them in response to subsidy increases before the ACA, but changed more salient benefits by roughly similar amounts in both periods. Plans in more competitive markets were less responsive to changes in federal subsidies than plans in less competitive markets, implying that competition pushes plan bids closer to costs. The plan bid response, combined with quality bonuses and growth in risk scores, helped soften the impact of decreasing subsidies on Medicare beneficiaries, which may help to explain the continued growth in Medicare Advantage enrollment after the ACA.

* We gratefully acknowledge Austin Frakt, Timothy Layton, Lyle Nelson, Andrew Ryan, Karen Stockley, Jacob Wallace, and W. Pete Welch for helpful comments. We also thank seminar participants at the 2018 American Society of Health Economists conference, 2017 Society of General Internal Medicine Annual Meeting, Harvard Medical School, Harvard T.H. Chan School of Public Health, Dartmouth Institute for Health Policy and Clinical Practice, University of Michigan, and University of Pennsylvania for helpful comments. Song acknowledges support from the Office of the Director, National Institutes of Health (NIH Director’s Early Independence Award No. 1DP5OD024564-01).
† Health, Retirement, and Long-Term Analysis Division, Congressional Budget Office, 441 D Street SW, Washington, DC 20515. Email: daria.pelech@cbo.gov
‡ Department of Health Care Policy, Harvard Medical School, 180A Longwood Avenue, Boston, MA 02115. Email: song@hcp.med.harvard.edu
1. Introduction

Private plans play an increasingly prominent role in the Medicare population. Over a third of Medicare beneficiaries today are enrolled in private plans through Medicare Advantage, up from one in five beneficiaries a decade ago (Jacobson et al., 2017). As enrollment has grown, federal payments to Medicare Advantage plans have increased from $78 billion in 2007 to over $200 billion in 2017. Federal spending on Medicare Advantage now accounts for roughly one percent of the U.S. gross domestic product (Centers for Medicare and Medicaid Services, 2017; Congressional Budget Office, 2017).

The federal government pays Medicare Advantage plans a set amount for each beneficiary they enroll, where the method for determining those amounts has changed over time. Per-beneficiary payments to Medicare Advantage plans grew after the Medicare Modernization Act (MMA) of 2003, which changed the structure of plan payments. The MMA both implemented a competitive bidding system among plans and changed the maximum federal payment to plans—the “benchmark” payment rate. Beginning in 2006, the benchmark payment rate for each county was updated annually via the maximum of several possible paths. Since the possible update paths were always positive, payments rarely decreased. As a result, payments increased more quickly after the MMA than before, inducing plan entry (McGuire, Newhouse, Sinaiko, 2011). The bidding mechanism also changed insurers’ incentives to allocate resources between enrollee benefits or premiums. Specifically, if a plan submitted its asking price for insuring a Medicare beneficiary—the “bid”—below the benchmark, the plan received a majority (three-fourths in the MMA) of the difference—the “rebate”—with which they could attract enrollees through benefits such as additional coverage or lower cost-sharing. Plans were also
required to charge an additional premium for the standard Medicare benefit (Medicare Parts A and B) if they bid above the benchmark. As of 2012, more than half of all beneficiaries were in zero-premium plans; that is, they were in plans that bid at or below the benchmark.

In the ensuing years, growth in plan entry, spending, and risk scores, particularly in higher cost areas, led to concerns that Medicare Advantage plans were overpaid. Estimates from 2009 suggested that, on average, per beneficiary spending in Medicare Advantage was 14 percent, or over $1,100 annually, higher than in traditional fee-for-service (FFS) Medicare (Biles et al., 2009; Medicare Payment Advisory Commission, 2009). In 2008, Congress enacted the Medicare Improvements for Payers and Providers Act (MIPPA), which froze benchmarks in 2011 at 2010 levels. In 2010, the Affordable Care Act (ACA) further changed the way that benchmarks were determined, with the goal of reducing the difference between per-beneficiary payments to Medicare Advantage plans and FFS per capita spending. Although those payment cuts were projected to decrease Medicare Advantage enrollment, enrollment rose from 25 percent of all Medicare beneficiaries in 2010 to a third of beneficiaries in 2017 (Jacobson, et al., 2017). To date, the impact of benchmark reductions after the ACA on plan behavior and pass-through to beneficiaries remains unknown.

We investigate the effects of declining federal payments to Medicare Advantage on plans and beneficiaries after the ACA and compare these effects with those of the increases in federal payments before the ACA. According to economic theory, if markets are perfectly competitive, the zero profit condition would predict that plans submit bids equal to their average costs. Thus, changes in the federal subsidy (benchmark) would have no impact on plan bids. Rebates would move with the benchmark and thus, there would be complete pass-through of the federal subsidies—the predominant share going to beneficiaries through changes in rebates and the
remaining share being retained by the Medicare program. Conversely, if insurers in Medicare Advantage have market power, then insurers may raise bids in response to an increase in the subsidy, thus extracting a portion of the subsidy as rents. (Providers might in turn extract those rents from insurers through higher prices for medical services.) Analogously, insurers may lower bids in response to a decline in subsidies, thus blunting the pass-through of subsidy cuts to enrollees in order to retain enrollment.

We exploit county-level variation in benchmark updates from 2006 through 2015 and find that for each dollar increase in the benchmark pre-ACA, plans raised their bids by 60 cents and passed through 27 cents to beneficiaries (with the residual returned to the government). For each dollar decrease in the benchmark post-ACA, plans reduced their bids by 56 cents on average, while passing through an average cut of 27 cents to beneficiaries in rebates. Within the change in rebates, plans reduced cost-sharing buy-downs and covered benefits by about twice as much on the margin after the ACA as they had increased those buy-downs and coverage before the ACA—perhaps suggesting that insurers allocate cuts towards plan characteristics that are less salient to beneficiaries. However, plans changed premiums by roughly similar amounts before and after the ACA. Moreover, plans in more competitive markets were less responsive to benchmark changes than plans in less competitive markets, suggesting that plans in more competitive markets were bidding closer to their costs.

Our findings add to the literature on incidence and pass through in Medicare Advantage, while offering several new insights. First, we find that on the margin, plans did not significantly alter their bid response post-ACA. That is, their bids changed by about the same magnitude when benchmarks were cut as when benchmarks were raised. We interpret this to mean that, just as plans keep a portion of growing subsidies as potential rents, plans similarly protect beneficiaries
from facing the full brunt of cuts when subsidies are reduced. Second, plans responded to reductions in subsidies by cutting less salient components of rebates (coverage of additional services and reductions in cost-sharing) to a larger degree than more salient components of rebates (premiums). Third, plans in more competitive markets were likely bidding closer to their costs, given that the changes in their bids were closer to zero. Fourth, plans’ reductions in bids, combined with additional payments due to quality bonuses and growth in risk scores after the ACA, helped lessen the decrease in rebates, which likely helps explain the continued growth in enrollment after the ACA.

This work builds on a literature that examines the incidence of increasing subsidies in Medicare Advantage, which generally shows an incomplete pass through with contributions from market power and selection (Cabral et al., 2014; Duggan et al., 2016; Song et al., 2013; Song et al., 2012). It also contributes to prior research showing insurers have market power in Medicare Advantage (Curto et al., 2015; Dunn, 2010; Pelech, 2018; Town and Liu, 2003) and that payments to private plan foster greater plan entry and enrollment (Afendulis et al., 2012; Atherly et al., 2004; Cawley et al., 2005; Chernew et al., 2008; Dowd et al., 2003; Maruyama, 2011; Pizer and Frakt, 2002).

In addition, our work is related to a broader theoretical and empirical literature on pass through of subsidies and taxes in health insurance, with implications for payment design given heterogeneity in competition between markets and demand among beneficiaries (Dague, 2014; Einav and Finkelstein, 2011; Geruso and Layton, 2017; Glazer and McGuire, 2011; Glazer and McGuire, 2013; Glazer and McGuire, 2017; Hackmann et al., 2015; Weyl and Fabinger, 2013).

The remainder of the paper is organized as follows. Section 2 provides an overview of the Medicare Advantage payment and bidding system, including payment changes introduced by the
ACA. Section 3 presents a framework for the economics of bidding and pass-through. Section 4 describes our data and empirical strategy. Section 5 presents the results of plan bid response and pass-through, as well as heterogeneity, salience, and sensitivity analyses. Section 6 concludes.

2. Payments in Medicare Advantage

2.1. Competitive Bidding Framework

Over the past three decades, the Medicare Advantage program (previously referred to as Medicare+Choice or Medicare Part C) has offered Medicare beneficiaries the option to enroll in private coverage that is potentially more comprehensive than traditional FFS Medicare. Most plans receive a per-beneficiary capitation payment that is risk-adjusted to reflect variation in enrollees’ health. Plans are required to cover Medicare’s Part A (hospital care) and B (physician) benefits at an actuarially equivalent level of cost-sharing – but also have discretion to modify premiums and benefits within allowed bounds. Over these years, payment policies have tended to encourage plan entry and expand beneficiary choice (McGuire et al., 2011).

The MMA introduced a competitive bidding system that can be summarized in 4 stages (Figure 1). First, each year the Centers for Medicare and Medicaid Services (CMS) publishes a county-specific benchmark payment rate that represents the maximum allowed federal payment to Medicare Advantage plans for insuring the average-risk beneficiary. The benchmark includes the expected costs of Medicare Part A and Part B benefits for a Medicare beneficiary of average risk (Medicare Payment Advisory Commission, 2014).
Second, plans submit their bids to CMS along with their projected enrollment in the counties in which they choose to operate. The bid represents a plan’s uniform asking price (i.e. projected cost plus allowed profit and administrative costs) for insuring an average risk beneficiary across all of the counties it chooses to operate in.

Third, CMS calculates a plan-specific benchmark as the weighted average of published benchmarks and projected enrollment across the plan’s counties. This plan-specific benchmark is then compared to the bid to determine the final plan payment and pass-through to beneficiaries. If the bid exceeds the benchmark, CMS pays the plan the benchmark, and the plan must collect the difference through an additional premium to beneficiaries. If the bid is below the benchmark, CMS pays the plan its bid plus a share of the difference—the rebate—which the plan must return to beneficiaries in the form of lower cost-sharing, supplemental coverage (e.g., vision, dental, or hearing), or lower premiums. (Plans can reduce the Part B premium or the Medicare Part D premium for plans that offer Part D benefits). Prior to the ACA, the rebate was 75 percent of the difference between the bid and the benchmark. After the ACA, this share varied depending on the plan’s quality rating, as described below.

Finally, beneficiaries shop among plans in their county of residence, comparing attributes such as premiums and rebates. Beneficiaries may enroll in a Medicare Advantage plan or enroll in FFS Medicare. Over the past decade, a greater proportion of beneficiaries have opted to enroll in Medicare Advantage. Numerous potential factors underlie this growth, one of which is that plans use their rebates to offer supplemental benefits, additional coverage for Medicare Parts A and B cost-sharing, and Part D benefits at lower cost than most stand-alone Part D plans.
2.2. Changes in the Affordable Care Act

The ACA introduced two changes to the payment system set forth by the MMA. First, the ACA changed the formula for calculating the benchmark. Since 2006, each county’s benchmark was updated annually using the maximum of several factors. The result was that the benchmark was sometimes much higher than FFS costs and could never decrease. After the ACA, while the benchmark remained a function of a county’s FFS Medicare spending, the benchmark was no longer updated in this manner.

Beginning in 2012, the benchmark in a county was adjusted to be a fixed percentage of local FFS Medicare spending in the county. This percentage was based on the quartile of per capita FFS Medicare spending in the county relative to other counties in the U.S. Specifically, counties in the lowest quartile of FFS Medicare spending were given a benchmark ($B_{kt}$) that equaled 115 percent of the county’s traditional Medicare spending ($TM_{kt}$), followed by 107.5 percent for counties in the second lowest quartile, 100 percent for those in the third lowest quartile, and 95 percent for those in the highest quartile of FFS Medicare spending, as below. This change was phased in between 2012 and 2017 (Medicare Payment Advisory Commission, 2011).

$$B_{kt} = \begin{cases} 
1.15 \times FFS_{kt} & \text{if } FFS_{kt} \text{ in the lowest quartile} \\
1.075 \times FFS_{kt} & \text{if } FFS_{kt} \text{ in the 2nd quartile} \\
1.00 \times FFS_{kt} & \text{if } FFS_{kt} \text{ in the 3rd quartile} \\
0.95 \times FFS_{kt} & \text{if } FFS_{kt} \text{ in the highest quartile} 
\end{cases}$$

---

1 The benchmark in each year was updated based on: (1) a minimum update that equaled the maximum of 2 percent or the national FFS Medicare growth rate, (2) a FFS update that equaled 100 percent of risk-adjusted FFS Medicare costs in a county, and (3) a floor update that equaled an urban or rural floor payment.
This revised benchmark methodology was expected to reduce average benchmark rates nationwide, as counties in the highest quartile of FFS spending disproportionately enrolled Medicare beneficiaries. Initial projections were that Medicare Advantage spending would slow, its plan generosity would decrease, and enrollment would decline (Congressional Budget Office, 2010; Office of the Actuary, 2010).

The second change brought forth by the ACA was the introduction of plan quality scores in the calculation of the rebate. Instead of setting rebates \( r_{jt} \) at 75 percent of the difference between the bid \( b_{jt} \) and the plan-specific benchmark \( B_{jt} \), provided that \( b_{jt} < B_{jt} \), the ACA allowed rebates to vary with plan quality, ranging from 50 percent of the difference for low-quality plans (less than 3.5 stars), to 65 percent for middle-quality plans (3.5 up to just below 4.5 stars), and 70 percent for highest-quality plans (4.5 stars and above).\(^2\)

\[
r_{jt} = \begin{cases} 
0.50(B_{jt} - b_{jt}) & | B_{jt} > b_{jt} \quad \text{if } < 3.5 \text{ stars} \\
0.65(B_{jt} - b_{jt}) & | B_{jt} > b_{jt} \quad \text{if } 3.5 \text{ to } 4.49 \text{ stars} \\
0.70(B_{jt} - b_{jt}) & | B_{jt} > b_{jt} \quad \text{if } \geq 4.5 \text{ stars} 
\end{cases}
\]

In addition, the ACA added bonus payments to plan-specific benchmarks based on plan quality. The initial legislation awarded bonuses to 4-star or higher plans. Subsequently, a Quality Bonus Payment (QBP) demonstration project extended bonuses to plans with 3 stars or better and increased the magnitude of bonuses for all awarded plans, including new plans; moreover, it doubled quality bonuses for certain counties with lower than average FFS Medicare spending.

\(^2\) For the purposes of calculating the rebate, new plans or plans with low enrollment were treated the same as 3.0 or 3.5-star plans, depending on the year. Minor adjustments in the rebate share by year, as well as the phase-in of these rebate shares from February 12, 2013, are detailed by CMS in their annual Advance Notice, which can be found at https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Announcements-and-Documents.html.

The combination of quality bonuses, quality-dependent rebates, QBP demonstration bonuses, and any increases in the intensity with which plans code diagnoses would be expected to help offset the reduction in benchmarks described above. To the extent that benchmarks were still reduced beyond these offsetting effects, the heterogeneous application of these bonuses across counties provides useful identifying variation for studying bid response and pass-through.

3. Economics of Bidding and Pass-through

3.1. Bidding and Insurer Competition

The bid is a mechanism by which plans set price. Plan bidding behavior provides insights into the nature of competition in the Medicare Advantage market, which directly affect the pass-through of subsidies to beneficiaries. Under perfect competition, plans would set prices equal to marginal cost, thus meeting the zero-profit condition. Exogenous changes in benchmarks would not be predicted to change the bid and instead would be passed through entirely to beneficiaries. Under a perfect insurer monopoly, however, prices are not equal to marginal cost, and thus plans could potentially capture all of the rents of increasing subsidies. Between these two extremes, imperfect competition among insurers would lead to a less than 1-for-1 relationship between

---

3 Plan payments are adjusted based on risk scores, which are higher if more diagnoses are recorded for each beneficiary. Medicare Advantage plans generally record more diagnoses for a beneficiary than are recorded for a similar beneficiary in FFS. Recent studies show that this difference in “coding intensity” between Medicare Advantage and FFS beneficiaries has increased in recent years (Kronick and Welch, 2014, Hayford and Burns, 2017).

4 To the extent that providers have greater market power over insurers, providers may also capture a share of these rents through their negotiations with insurers.
changes in the benchmark and changes in bids—with the elasticity of bids with respect to the benchmark closer to 0 in more competitive markets and closer to 1 in less competitive markets. Imperfect competition would result in partial pass through of changes in the federal subsidy to beneficiaries.

Prior literature has largely supported this latter scenario. Cabral and colleagues performed a difference-in-differences analysis which exploited variation in the 2000 Benefits Improvement and Protection Act. They found that for every dollar increase in plan payments, about 53 cents were passed through to enrollees, of which 45 cents were devoted to premium reductions and 9 cents to additional benefits. Pass-through was 74 cents in the most competitive markets and 13 cents in the least competitive markets. The authors argue that this evidence suggests that market power is a larger factor than advantageous risk selection contributing to imperfect pass-through (Cabral et al., 2014).

Song and colleagues examined plan bidding behavior directly over the first five years of the bidding system established by the MMA. Using variation in benchmark updates, including 2 “rebasing” years (during which benchmark updates were more likely exogenous), they found that every dollar increase in the benchmark led to an approximately 53-cent increase in the bid (Song et al., 2013), implying a 35-cent pass-through in enrollee benefits when accounting for the 25 percent of the difference between the bid and benchmark that was recouped by Medicare (Song et al., 2012). The number of insurers was independently associated with smaller changes in bids, holding constant the change in benchmark, consistent with the prediction of competition pushing bids closer to costs.

Using a similar specification within a structural approach, Curto and colleagues find a qualitatively similar pass-through of about 40 to 60 percent, consistent with plans having fairly
significant market power (Curto et al., 2014). In contrast, Duggan and colleagues exploit policy-induced variation in benchmarks updates among select counties close to the urban floor threshold in 2007-2011 and find a lower pass-through of about one-eighth on average. Nevertheless, they also found that pass-through was larger in more competitive counties, specifically concentrated among plans of one particular large insurer (Duggan et al., 2016).

Taken together, these studies are consistent with imperfect competition among plans and a meaningful role for insurer market power in setting bids, resulting in incomplete pass-through. However, they all examined a period during which plan payments were growing. Whether plans pass through decreases in the benchmark in a similar manner—that is, whether there is a mirror image in plans’ response when subsidies decline—remains an open question.

There are several reasons why plans’ bids may respond differently pre- and post-ACA. First, bid responses need not be symmetric; if premiums or benefits exhibit downward stickiness, then insurers may increase benefits and decrease premiums in response to benchmark increases more than they decrease those benefits or raise premiums in response to benchmark cuts. Second, the nature of plan competition may be different in the post-ACA years. For example, private fee-for-service plans in Medicare Advantage, which surged in enrollment after 2006, exited in large numbers after policy changes enacted in the Medicare Improvements for Payers and Providers Act of 2008 (Biles et al., 2008; Pelech, 2017). Second, provider consolidation has increased significantly over the last decade (Baker et al., 2014; Neprash et al., 2015). Providers may extract incomplete pass-through from insurers through their price negotiations, and thus, consolidation

5 If an insurer in Medicare Advantage also contracts with providers for the commercially-insured (e.g. employer-sponsored insured) population, then providers may theoretically extract rents away from the insurer by raising prices either in Medicare Advantage, in the commercially-insured market, or both. However, recent evidence suggests that insurers in Medicare Advantage are able to require providers to accept largely FFS Medicare prices, in part due to a provision that constrains out-of-network prices to be the same as FFS Medicare prices (see Berenson et al., 2015; Baker et al., 2016; Trish et al., 2017; Pelech, 2018; Maeda and Nelson, 2018). However, whether all insurers can do this and whether this is true for services besides physician and hospital services is less well understood.
in the provider market could impact whether plans can pass through benchmark changes by reducing premiums or increasing benefits. Third, many insurers in Medicare Advantage also sell plans on the ACA marketplace. Thus, in the years after 2014, underlying insurer costs may change in such a way that alters their bidding strategy in Medicare Advantage. Finally, insurers may respond to payment cuts differently than to payment gains in a manner suggested by prospect theory (Kahneman and Tversky, 1979). If insurers valued losses more than equal-sized gains, as individuals do, then we would expect to see a dissimilar pass-through when the benchmark is cut, holding all other factors constant.

Given these factors, it is an empirical question whether plan bidding behavior and pass-through during benchmark cuts will mirror those during benchmark increases. Exploiting variation in benchmark cuts after the ACA, we characterize the nature of these plan responses after the ACA and compare them to those before the ACA.

3.2. Salience of Pass-through Channels

In Medicare Advantage, plans have multiple dimensions along which they can pass through the rebate to beneficiaries, including through premiums, additional benefits, and cost-sharing reductions. Some are salient, such as the plan’s Part C (Medicare Advantage) premium, deductible, or out-of-pocket maximum. Others are arguably less salient, such as additional benefits, such as vision, dental, or hearing coverage.

Literature on salience and incentives suggest that individuals are more responsive to salient incentives relative to less salient incentives (Chetty et al., 2009; Finkelstein, 2009). In the Medicare Advantage context, we would predict that during periods of subsidy increases, plans
might pass through benefits in a more salient manner, such as through premium reductions rather than extra coverage. Several papers suggest that this is the case. Cabral et al. (2014) showed that plans passed through payment increases overwhelmingly via premium reductions in the early 2000s. Stockley (2014) showed that Medicare Advantage plans rarely reduced the Medicare Part B premium, because premium reductions were not transparently displayed when beneficiaries chose plans and reductions in Part B premiums were applied directly to beneficiaries’ social security checks (rather than being paid directly to the beneficiary). (This lack of transparency, combined with high benchmarks, led to the majority of plans charging $0.) Pelech (2018) showed that plans are more likely to adjust benefits than premiums, particularly when their Medicare Advantage premium is $0. We expand on this analysis by examining the differential pass-through between premiums and other rebate channels during benchmark declines post-ACA and compare it to differential pass-through pre-ACA.

4. Data and Methods

4.1. Data

We analyzed publicly-available Medicare Advantage benchmark, bid, and rebate data from CMS from 2006 through 2015. The benchmark, published at the county level for each year, is the monthly capitation rate for a beneficiary of average risk—or a beneficiary who has a risk score of 1.0—using the CMS- Hierarchical Condition Category (HCC) risk score model.\(^6\) Beginning in 2012, the benchmark incorporated star ratings of plan quality, as discussed above.

\(^6\) Available at: https://www.cms.gov/Medicare/Health-Plans/MedicareAdvvtgSpecRateStats/Ratebooks-and-Supporting-Data.html?DLSort=0&DLEntries=10&DLPage=1&DLSortDir=descending
Bidding data are submitted by Medicare Advantage plans to CMS. Those data also include a plan’s Medicare Advantage risk score, which is the weighted average of the risk scores of its membership across counties, and a plan’s rebates.

To measure the degree of competition, we calculated the number of unique insurers (“parent organizations” in the data) that operated in each county. We used insurers rather than plans because a single insurer can offer multiple plans in a county and bidding decisions are presumably made at the insurer level. We treat counties as markets because the Medicare Advantage plan types included in our sample (HMOs, PFFS plans, and local PPOs) make county-level decisions about where to operate (Layton and Ryan 2015; Pelech 2017). We also calculated a measure of competition among insurers in a county using the Herfindahl-Hirschman Index (HHI). HHI is arguably a more robust measure of competition, because it reflects both the number of insurers and the distribution of shares among those insurers. We hypothesized that more insurer concentration would, all else held equal, push changes in bids towards zero.

For our analysis, we used risk-standardized benchmarks, bids, and rebates. We accounted for the effects of the quality bonus program on plan payments in the post-ACA period by calculating the quality-adjusted benchmark for each plan in each county and then calculating an enrollment-weighted average of those benchmarks at the county level. As plans exercise some control over their quality and thus, a quality-adjusted benchmark might be endogenous, we also performed robustness checks that used a benchmark calculated as though the quality bonus program was not in place.

In all regressions, we included logged county-level FFS Medicare risk scores, and Medicare Advantage risk scores, averaged across all plans in the county. Given evidence that

---

7 See the Centers for Medicare and Medicaid Services website on Bid Forms & Instructions, available at: https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Bid-Forms-Instructions.html.
shows risk-adjustment in Medicare Advantage is imperfect (Newhouse et al., 2015), we expected risk scores to be related to changes in bids in the analysis. (If risk-adjustment were perfect, the plan risk score would have no impact on bids.) Plan payment is the product of the risk-standardized (in other words, average risk) plan-specific benchmark multiplied by the plan risk score. Therefore, we hypothesized that an increase in the plan risk score would be independently associated with a smaller bid response. In other words, to the extent that the risk score overstates true risk, the higher the plan risk score, the lower the bid needed to meet the same revenue. Analogously, we expected the plan risk score to be positively associated with rebates. Risk scores were logged so that changes in those variables could be interpreted in percentage terms.

We add several other controls to all regressions to absorb additional variation that may affect bids. Namely, we control for county-level FFS per capita spending to absorb any time-varying county-level variation in utilization that might affect plans’ bids. We also control for variation in local economic conditions using the county-level unemployment rate from the Bureau of Labor Statistics and county-level per capita income from the Bureau of Economic Analysis. These controls are important, as other studies have shown that they may be linked to growth in Medicare Advantage (Johnson, et al. 2016).

Our sample included health maintenance organization (HMO), local preferred provider organization (PPO), and private fee-for-service (PFFS) plans in our analysis. Special needs plans, which largely enroll dual-eligible beneficiaries, were not included in our analysis because many dual-eligible beneficiaries have their benefits and premiums covered by the Medicaid program and hence, insurers offering SNPs are not necessarily competing by lowering premiums or increasing benefits. We excluded employer group waiver plans because they do not compete for enrollees and thus face different incentives, regional PPO plans because they face different
benchmarks, and several other plan types including cost plans and Programs of All-Inclusive Care for the Elderly (PACE) plans, which do not participate in the bidding process. All dollar figures were adjusted to year 2015 using the consumer price index.

To decompose changes in the rebate into changes in different categories of benefits, we use Medicare’s expected out-of-pocket cost data. The out-of-pocket cost data are constructed by CMS using data on FFS beneficiaries’ spending and are used on Medicare’s plan finder website to assist beneficiaries in selecting a plan. They have been used frequently to measure benefit generosity and have been found to correlate with beneficiary plan choice (Dunn, 2010; Cabral et al., 2014; Stockly et al., 2014). The data reflect expected spending for a representative beneficiary in each plan in Medicare Advantage, given the plan’s premiums, copays, deductibles, spending limits, and covered benefits. Spending in each plan is simulated using FFS beneficiaries consumption patterns, and thus, measures of benefit generosity are unaffected by beneficiary response to plan generosity (moral hazard) or adverse selection across plans.

We extract several measures of premiums and benefit generosity from the out-of-pocket cost data. For premiums, we examine the total premium, which includes a plan’s Medicare Advantage (or Medicare Part C) premium, Medicare Part D premium, Medicare Part B premium, and any amount by which the plan reduces the beneficiary’s Part B premium (Part B buy-down); each of these premium components is also examined separately.

To measure the generosity of plans’ cost-sharing and covered benefits, we examine beneficiaries’ total expected out-of-pocket spending in each plan (excluding premiums), spending on pharmaceuticals, and spending on optional, supplemental benefits. Total expected out-of-pocket costs capture what a beneficiary would spend on Medicare Parts A and B benefits (including hospital, physician, diagnostic and lab spending), pharmaceuticals, and other
categories not covered under the Medicare FFS benefit, including vision, dental, and hearing care. Spending on pharmaceuticals reflects what a beneficiary would spend on Part D drugs in each plan. Optional, supplemental benefits capture spending on vision, preventative dental, and hearing care, after accounting for a plan’s coverage of such categories of care. Higher expected spending reflects lower plan generosity in each category.  

4.2. Empirical Strategy

We examined the impact of changes in the benchmark on bids by exploiting variation in benchmark updates. Our identification strategy is rooted in comparing changes in the dependent variables among counties that saw large changes in their benchmark to counties that saw small changes in their benchmark, pre- and post-ACA. We used the following longitudinal reduced form model,

\[ Y_{kt} = \beta_1 * B_{kt} + \beta_2 (B_{kt} * post_t) + X_{kt} \delta + \gamma_k + \gamma_t + \varepsilon_{kt} \]

where \( B_{kt} \) is the county benchmark in county \( k \) at time \( t \), the vector of covariates, \( X_{kt} \), denotes time-varying characteristics of a county, including contemporaneous FFS Medicare spending, FFS Medicare risk score, the average Medicare Advantage risk score weighted across plans in the county, and number of insurers or HHI in county \( k \). The indicator \( post \) denotes the post-ACA period; \( \gamma_k \) and \( \gamma_t \) are county and year fixed effects, respectively, and \( \varepsilon_{kt} \) is the error term. When the outcome \( Y_{kt} \) is the bid, the coefficient \( \beta_1 \) captures the average pre-ACA bid response for each

---

8 Changes in OOPC may understate changes in generosity, because this statistic is calculated assuming that all care is provided in-network. If plans respond to benchmark reductions by narrowing their networks, this dimension of generosity will not be captured by this measure.
dollar change in the benchmark, while $\beta_2$ captures the average difference on the margin in bid response after the ACA relative to before. ($\beta_1 + \beta_2$ represents the mean bid response for every dollar change in the benchmark post-ACA.) Although post_t is common to all observations in a year, $\beta_2$ is identified by heterogeneity across counties in benchmark changes in the post-period.

The model was weighted by county-level Medicare Advantage enrollment averaged across the years in the data, and standard errors are clustered on the county level to account for correlation in bids within county over time.

Given that ACA payment cuts were phased in over time and benchmarks varied over time due to the quality bonus program, we also estimated year-specific coefficients as below, where $\beta_t$ are the coefficients of interest. In sensitivity analyses, we examined the robustness of our results under alterations in the model and covariates.

$$Y_{kt} = \sum_{t \in (2006, 2015)} \beta_t \ast B_{kt} + X_{kt}\delta + \gamma_k + \gamma_t + \varepsilon_{kt}$$

To examine bid response and pass-through under different market conditions directly, we explored heterogeneity of effects between counties with high and low levels of competition. In one set of specifications, we defined counties as being high competition if they had more than 2 insurers operating in them in 2012, and in the other, they were defined as being high-competition if insurer HHI was below the median in 2012 (HHI=5,473). Counties were omitted from this regression if no insurer operated in them in 2012. Given that the majority of Medicare Advantage beneficiaries reside in urban counties and those counties are disproportionately in the highest spending quartile of FFS Medicare, which received the largest benchmark cuts under the ACA, we also examined urban and rural counties separately.
To understand how plans passed through changes in rebates to beneficiaries, we assessed different categories of spending that were affected by rebates, including the Part B premium, Part D premium, plan premium (plans that bid above the benchmark), out-of-pocket costs, drug spending, and additional benefits.

5. Results

5.1. Summary Statistics

Characteristics of Medicare Advantage plans and the markets they operate in are shown in Table 1. In real terms, average plan-level benchmarks nationwide decreased from $948 per member per month (PMPM) before the ACA changes to the benchmark formula became effective in 2012 to $874 PMPM after the changes. Similarly, average bids and rebates were lower after 2012, although total risk-adjusted payments to plans declined by slightly less than bids or benchmarks because risk-adjustment scores were higher in the post-ACA years. Figure 2, Panel A illustrates these mean benchmarks and bids in Medicare Advantage during the entire study period. In real terms, the average benchmark grew by $35 pre-ACA (2006 and 2009) and declined by an average of $81 after the ACA payment cuts (2012-2015); the slope of this decline increased after 2014, consistent with the conclusion of the QBP demonstration program. Of note, steeper cuts in the benchmark would have occurred in the absence of the QBP demonstration program. Additionally, trends in bids and benchmarks were largely parallel across counties divided by quartiles of FFS spending (Figure 2, Panel B).
Meanwhile, benefits, as measured by projected out-of-pocket costs, were less generous and premiums were higher after 2012 relative to before (Table 1). Competition, as measured by the average number of insurers offering plans, declined slightly from 5.36 in the years before 2012 and 5.01 after, although insurer HHI was relatively unchanged between the two periods. Average beneficiary risk in Medicare Advantage relative to average beneficiary risk in FFS Medicare increased slightly, from 0.96 prior to 2012 and 0.99 after. Changes in the ratio of risk between the Medicare programs might reflect declines in selection of healthier beneficiaries into Medicare Advantage (Brown et al., 2011; Cabral et al., 2014; Newhouse et al., 2012) or it might reflect increases in the intensity with which diagnoses are coded in the Medicare Advantage program (Geruso and Layton, 2015, Kronick and Welch, 2014, Hayford and Burns, 2017).

Figure 3 shows a time series of beneficiary rebates in real terms and total enrollment in Medicare Advantage, illustrating continued growth in enrollment despite a relative decrease in rebates over the years. Of note, the actual rebates were greater than initial projected rebates, which were projected to decline substantially beginning in 2010 due to the ACA-related changes in the benchmark formula (Centers for Medicare and Medicaid Services, 2010). This difference between the actual and projected rebates was likely driven by quality bonuses, which boosted the benchmark, and the plan bid response, which we examine in this paper.

5.2. Plan Bid Response and Rebate Response

Our main estimates of the bid and rebate response are shown in Table 2 and Figure 4. From 2006 to 2012, a period of growth in the benchmark before the ACA, plans raised their bids by an average of 60 cents for every dollar increase in the benchmark. After the ACA-related
benchmark formula changes (and start of quality-based bonuses), plans lowered their bids by an average of 56 cents for every dollar reduction in the benchmark. Plans’ responses to changes in benchmarks post-ACA were statistically different than their responses pre-ACA, although the magnitudes were very similar.

As a result, plans passed through an average of 27 cents in rebates for every dollar increase in the benchmark before the ACA (the remainder going to the Medicare Trust Fund in the form of shared savings for the federal government). After the ACA, plans lowered the rebate by almost the same amount as they had increased them pre-ACA. On balance, our main estimates illustrate fairly similar average magnitudes of the bid and rebate responses to changes in the benchmark during a period of benchmark growth and a period of benchmark declines. In fact, bid responses are remarkably stable over the study period, ranging from 0.66 (in 2007) to 0.50 (in 2015) (see Figure 4). The stability of those coefficients suggests that the overall estimate of bid responsiveness accurately reflects plan behavior, rather than being a spurious result.

5.3. Heterogeneity of Bid Response and Rebate Response

Plans’ response to benchmark changes varied based on the extent of competition in the Medicare Advantage market (Table 3, A). Plans in more competitive counties were less responsive to benchmark changes than plans facing less competition. Plans in more competitive counties adjusted bids by approximately 58 cents for every dollar change in benchmark, whereas

---

9 One way in which the bid regression and the rebate regression differ is that rebates are adjusted for risk scores, as they are measured and reported by CMS as actual dollars given to Medicare Advantage plans. Meanwhile, bids and benchmarks are not adjusted for risk as they are reported for the average risk (1.0 risk) beneficiary (i.e. they are risk-standardized). We thus risk-standardized county-level rebates using plan-level risk scores, which may not perfectly capture all the risk of plans in the county.
plans in less competitive counties adjusted bids by 69 cents for every dollar change in the benchmark.\textsuperscript{10} We found similar heterogeneity when defining competition using insurer HHI. In addition, we found that the bid response was closer to $1 ($0.82) in rural counties, whereas it was closer to $0.56 in urban counties. This is consistent with the fact that 68 percent of rural counties were classified as non-competitive, using the definition above, whereas only 36 of urban counties were non-competitive.

Analogous heterogeneity was observed in the rebate response (Table 3, B). Following from the changes in bids, plans in more competitive markets passed through a larger share of each dollar change in the benchmark to beneficiaries than plans in less competitive markets. Namely, plans in more competitive counties passed through 29 cents in rebates for every dollar change in the benchmark versus 16 cents in less competitive counties. Plans in urban counties passed through about 31 cents of every dollar, whereas plans in rural counties passed through nearly none of those benchmark changes.

5.4. Decomposition of Changes in the Rebate

We examine how insurers allocated changes in rebates to by testing for changes in measures of benefits and premiums. Table 4 and Figure 5 show marginal changes in the total premium, the three components of the total premium (Medicare Advantage plan premium, Part D premium for plans that offer Part D coverage, and Part B premium), cost-sharing, and covered benefits offered by the plan as a function of a dollar change in the benchmark. Changes in cost-

\textsuperscript{10} Counties were classified as more competitive in they had more than 2 insurers operating in them 2012, and less competitive if they had two or fewer insurers operating in them. Counties were classified based on 2012 levels of competition so that changes in competitiveness would not confound results – and plans with no insurers in 2012, comprising 3% of county-year observations, were omitted from analysis.
sharing and covered benefits are measured by changes in total out-of-pocket spending for a
representative beneficiary, drug spending for a representative beneficiary, and spending on
supplemental benefits (vision, hearing, and dental services). Out-of-pocket cost data are not
available for 2006, so Column 1 of Table 4 replicates the regression of benchmarks on rebates
with 2006 omitted. All other regressions in this portion of analysis also omit 2006.

During the period of benchmark increases before the ACA, each dollar increase in the
benchmark was associated with a 6.7-cent reduction in total premiums that was passed through
to beneficiaries in the form of lower Medicare Advantage premiums (-4.6 cents) and lower Part
B premiums via plan buy-downs (-2.3 cents), but no changes in the Part D premium. Reductions
in Part B premiums are likely less salient to consumers than reductions in Medicare Advantage
plan premiums, because the former are added directly to beneficiaries’ social security checks and
the latter are paid directly by the beneficiary (Stockley et al., 2014).

During the period of benchmark decreases after the ACA, plans increased premiums by
8.3 cents for each dollar decrease in the benchmark. This marginal increase in premiums post-
ACA was significantly larger than marginal decreases pre-ACA, but none of the coefficients on
premium components were significantly different pre- or post-ACA—perhaps because all
marginal changes were rather small.

Insurers also increased plan benefits in response to increased benchmarks and decreased
plan benefits when benchmarks decreased; unlike premiums, all components of benefits that we
examined decreased by more post-ACA than they increased pre-ACA. Pre-ACA, total out-of-
pocket costs for the representative beneficiary fell by 9 cents for every dollar increase in
benchmarks. Changes in drug spending comprised 5 cents of the total change in out-of-pocket
costs, and changes in spending on extra benefits accounted for a 1-cent change in out-of-pocket
costs. Post-ACA, out-of-pocket costs increased (benefits became less generous) with each dollar reduction in the benchmark. Specifically, total out-of-pocket costs for beneficiaries increased by 21 cents, total out-of-pocket drug spending increased by 13 cents, and total out-of-pocket spending on extra benefits increased by 2 cents.

Thus, after the ACA, plans reduced the generosity of cost-sharing and covered benefits by about twice as much on the margin as they had increased the generosity of these dimensions before the ACA (see Figure 5). In contrast, plans changed premiums—which are plausibly more salient to consumers—by roughly similar amounts pre- and post-ACA in response to benchmark changes.

5.5. Instrumenting for Medicare Benchmarks

One concern with regressing changes in benchmarks on plan bids is that those two variables could be endogenously related. For instance, favorable selection into Medicare Advantage could leave FFS Medicare with higher per capita spending -- which would increase benchmarks -- and lower average spending among Medicare Advantage beneficiaries, which could reduce plan bids. Although all regressions control for FFS spending, Medicare Advantage plans cover more than the basic FFS benefit, and thus, unobserved selection could reduce their bids, biasing coefficients downward. Alternately, several papers provide evidence of a spillover effect -- or that greater Medicare Advantage penetration reduces spending in FFS (Baicker and Robbins, 2015). Reductions in FFS spending due to spillovers could reduce benchmarks, and simultaneously, areas with more Medicare Advantage penetration might have more insurers and
more competition, which would likely lower bids. Thus, benchmarks and bids might be related in ways other than through plans’ direct response to benchmark changes.

To test for potential endogeneity, we instrument for benchmarks using the percentage of FFS beneficiaries who are enrolled in Medicare Part A only. The percentage of “A-only” beneficiaries affects Medicare Advantage benchmarks because CMS calculates benchmarks by summing Part A per capita spending and Part B per capita spending. Beneficiaries who are only enrolled in Medicare Part A are included in the calculation of Part A per capita spending, even though their average risk-adjusted spending on Part A services is lower than beneficiaries who are enrolled in both Parts A and B. (Many of these beneficiaries spend less because they still have employer-sponsored insurance and, thus, Medicare is the secondary payer.) The Medicare Payment Advisory Commission has found that including Part A-only beneficiaries in the benchmark calculation reduces benchmarks by about 1 percent nationally, and this effect is much larger in counties with more A-only enrollment (Medicare Payment Advisory Commission, 2017).

The percentage of FFS beneficiaries who are A-only plausibly meets the exclusion criteria if, conditional on choosing FFS, a beneficiary’s choice of enrolling in Medicare Part B changes plan bids by changing the benchmark. This assumption is more plausible under specific conditions. First, we construct our instrument using the percentage of the aged (beneficiaries over 65) who are enrolled in Part A only, rather than the percentage of A-only beneficiaries among both the aged and disabled. Beneficiaries over 65 are more likely to be A-only because they still have employer-sponsored coverage. As the decision to retire is unlikely to be related to Medicare Advantage plans’ bids, the decisions to be A-only is more plausibly unrelated to the Medicare Advantage market among the aged. In contrast, the disabled may be more likely to
become A-only because they cannot afford the Part B premium. Those beneficiaries might be making joint decisions about enrolling in Medicare Advantage or FFS based on their options for secondary coverage, and therefore their decision might be influenced by benchmarks and bids.

Second, the probability that beneficiaries over 65 choose to stay working and continue their ESI coverage is likely related to local, time-varying economic conditions, which might also influence plan bids. We address this by controlling for the unemployment rate and county-level per capita income in all regressions. Additionally, the percentage of beneficiaries that choose to be Part-A-only and forgo Part B coverage is likely related to underlying population health. That is, beneficiaries may be more likely to stay employed and insured if they are in better health. Controlling for per capita FFS costs partially addresses this concern; additionally, time-invariant differences in population health are absorbed by county fixed effects.

Finally, we specifically focus on the percentage of FFS beneficiaries who are enrolled in Part-A only to avoid reverse causality. Reverse causality might arise because beneficiaries enrolled in Medicare Advantage must be enrolled in Part A and Part B, and hence, the percentage of all Medicare beneficiaries (not just those in FFS) who are enrolled in Part A and Part B is affected directly by Medicare Advantage plans’ bids. We avoid this issue by focusing only on the percentage of FFS beneficiaries who are A-only, where our identification hinges on beneficiaries deciding to forgo Part B once they have enrolled in Medicare FFS.

We construct the percentage of the FFS enrollment in the county that is Part A-only using the publicly-available files on FFS per capita spending among the aged. Specifically, we subtract Part B enrollment from Part A enrollment and divide by Part A enrollment. That statistic is a reasonable proxy for Part-A only enrollment because—although there are some beneficiaries who are enrolled in Part B only—estimates suggest that those numbers are quite small (Medicare
Payment Advisory Commission, 2017). For less than 1 percent of observations where A-only enrollment is negative when calculated this way, we replace those values with 0. (Results were unaffected when these values were allowed to be negative.) We then regressed benchmarks on the percentage of A-onlies in a county as a first stage. This regression uses all the same controls used in main results, except we do not control for number of insurers, to avoid reverse causality in our first stage.

Column 1 Table 5 shows that, in the first stage of this regression, the benchmark is reduced by $4.06 dollars for each additional percentage point of FFS beneficiaries in a county who are A-only. In the average county in 2015, 8 percent of FFS beneficiaries were A-only, so this estimate implies that benchmarks in the average county were roughly $32 lower than they would be if all FFS beneficiaries were enrolled in Medicare Parts A and B. The F-statistic on this regression is 1618, which suggests that the instrument strongly meets the relevance criterion.

Column 2 shows our baseline regression of bids on benchmarks, replicated here without controlling for the number of insurers in the county and without the interaction in the post period, to allow for comparison with IV results. Column 3 shows the effect of instrumenting for the benchmark using the percentage of FFS beneficiaries who are A-only. Coefficients are similar in the two regressions. Without instrumenting, the coefficients on benchmarks suggest that plans reduce their bids by 62 cents for each additional dollar of benchmark payments. After instrumenting, it appears that plans reduce their bids by 71 cents. Based on this analysis, we conclude that endogeneity is not strongly affecting our estimates.
5.6. Sensitivity Analyses

Table 6 tests the robustness of our main estimates to alterations in the model or variables. Omitting key controls, including county-level FFS risk, county-level Medicare Advantage risk, and the number of insurers operating in a county, had minimal effects on the coefficients of interest (Columns 2-4). Across specifications, estimates of plans’ pre-ACA bid response are between 59 and 62 cents on the margin, while estimates of plans’ post-ACA bid response are between 55 and 58 cents on the margin.

Calculating the benchmark without accounting for benchmark increases due to quality bonuses also had minimal effects (Column 5). We performed this specification check because plans can influence their quality scores—either directly by engaging in quality improvements or indirectly by cancelling and consolidating lower-quality plans. Thus, benchmarks that include quality bonuses could be endogenously related to plans’ choice of bid. However, coefficients on benchmarks that exclude quality payments are 62 cents, pre-ACA, and 57 cents, post-ACA. Those estimates are similar to estimates of 60 and 56 cents in a regression that uses benchmarks that account for plans’ quality scores.

We also analyzed insurers’ bid response using plan-years as the unit of analysis, instead of county-years. Analyzing data on the plan level necessitated several changes in our approach. Namely, we used CMS’s published plan-level data on plan bids (instead of county-level data), and we controlled for FFS risk and the number of insurers operating in a plan’s markets by averaging those measures across all counties in which a plan operated, weighting by a plan’s enrollment in each county. Regressions were weighted by plan-level enrollment (instead of county-level Medicare Advantage enrollment), averaged across all years for which a plan
operated under a given identification number, and included plan fixed effects instead of county fixed effects. All regressions included year fixed effects.\textsuperscript{11}

Despite changes in key variables and approach, coefficients in the plan-level analysis were remarkably similar to those in the county-level analysis. Specifically, plans appeared to increase their bids by between 62 and 63 cents for each additional dollar of benchmarks, pre-ACA, and they decreased them by 53 to 60 cents, post ACA. (Estimates are similar for HMOs and PPOs because analysis includes plan-level fixed effects.) Changes in rebates were also similar across most specifications. One difference of note was that estimates of pass through were lower when we consider the benchmark calculated without stars, which is consistent with the hypothesis that the quality bonus program helped shield beneficiaries from benchmark cuts.

6. Conclusion

In the years following passage of the ACA, benchmark payments to Medicare Advantage plans decreased, leading to three main effects—a decrease in plan bids, an associated decrease in beneficiary rebates, and a shift by plans in their allocation of pass-through across categories that appear to differ in salience. To our knowledge, this is the first analysis of competitive bidding and pass-through in Medicare Advantage after the ACA. It also provides a partial explanation for why enrollment in Medicare Advantage has continued to grow, defying experts’ projections.

On average, a $1 decrease in the benchmark led to about a 60-cent decrease in plan bids. This suggests that plans have been bidding above their true costs, possibly using their margin to

\textsuperscript{11} Those changes likely had small effects on the set of included plans. Specifically, CMS’s published plan-county level data excludes observations with fewer than 11 enrollees – so those observations were excluded from the plan-level analysis, but were likely included in the published county-level data on bids.
absorb decreases in benchmarks without needing to exit the market. Before the ACA, the size of this bid response was similar, though in the positive direction, as benchmarks grew, consistent with prior evidence (Cabral et al., 2014; Curto et al., 2015; Duggan et al., 2014; Song et al., 2013 and 2012). Relative to a scenario with no bid response (for example, perfect competition), this symmetrical bid response after the ACA lessened the potential decline in enrollee benefits. Moreover, declines in final plan payments and enrollee benefits were further offset by new bonuses from quality incentives and higher beneficiary risk scores.

After the ACA, the 56-cent increase in plan bids led to about a 27-cent decrease in the pass through of rebates to beneficiaries. This implied that beneficiaries received a smaller share of the benchmark cuts than plans did. (The government keeps the residual of the difference between the benchmark and the bid when the bid is below the benchmark, depending on the plan quality star level.) This also suggests that insurers protected or kept beneficiaries from facing the full cost of decreasing subsidies, possibly to keep their Medicare Advantage plans attractive to beneficiaries and remain competitive in the market. Our results suggest that plans in less competitive markets (those with market power), were more able to protect beneficiaries from facing the brunt of the benchmark cuts, given their ability to generate a larger bid response.

Not only did insurers change the magnitude of pass-through to beneficiaries as subsidies declined after the ACA, they also allocated cuts more towards cost sharing and additional benefits than they did before the ACA, when pass-through was increasing. This is consistent with premiums being potentially more important to consumers than cost-sharing or additional benefits. This may be because premiums are more salient or guaranteed, whereas extra benefits in coverage are less salient or may only be realized if the need for medical care arises.
Our results are consistent with imperfect competition in Medicare Advantage. If Medicare Advantage markets were perfectly competitive, changes in the benchmark would not affect plan bids, as competition would ensure that plans push each other’s bid down to their marginal costs of delivering services. However, our finding that bids do respond to changes in the benchmark—indeed of risk—suggests otherwise. Our results suggest that decreases in the benchmark likely resulted in lower insurer or provider profits. When benchmarks declined, plans cannot lower their bids indefinitely and remain financially viable. They may respond in other ways: narrowing their networks, paring back on their product line, or exiting parts of their service area. In addition, they may exit the Medicare Advantage market altogether.

That the magnitude of plan response was similar when benchmarks declined as when they rose has two meaningful implications. First, it suggests that insurer competition in the Medicare Advantage market is imperfect. Second, declining subsidies were shared between plans and beneficiaries. That enrollment in Medicare Advantage nationwide continued to grow despite decreased benchmarks is consistent with our finding that plans shielded rebate dollars from the brunt of the cuts, which allowed them to continue offering rebates to beneficiaries. Our results are also relevant for federal spending. Policies that affect the benchmark will likely have a larger budgetary impact beyond the direct effects on estimated benchmark spending because variation in benchmarks has been found to induce plan entry or exit (Layton and Ryan, 2015; Maruyama, 2011). Insurers’ ability to alter their bids should also be taken into account.

Our analysis has several limitations. First, we do not characterize plan entry or exit in response to benchmark changes, in part because plans’ responses have been studied elsewhere (Layton and Ryan, 2015; Maruyama, 2011). Second, while our analysis expands on prior work by studying how plan benefits respond to changes in the benchmark, our measure of benefits...
may not adequately capture all margins that plans might adjust. For instance, the out-of-pocket cost measure is calculated under the assumption that all care is received in network. If plans respond to benchmark changes by changing network size or out-of-network cost sharing, this will not be captured in our analysis.

In addition, other research has documented that the intensity with which plans code beneficiaries’ diagnoses has increased over the study period, resulting in higher reimbursement for a given level of bid (Kronick and Welch 2014, Hayford and Burns 2017). Although changes in coding may have shielded plans from benchmark cuts, quantifying the relationship between diagnostic intensity and benchmark changes is better done using patient level data and is an area for future research. Finally, although we find that plan responses to benchmark cuts were limited, this result might not generalize to all benchmark cuts. Rather, there is likely some level of payment at which plans would not be able to cut their bids further and would be forced to raise premiums, decrease benefit generosity, or exit the market.

In summary, after growing before the ACA, benchmarks in Medicare Advantage decreased post-ACA. Plans responded to payment cuts by lowering their bids, and plans in less competitive markets lowered bids by more. This plan bid response, combined with additional payments from quality bonuses and growth in risk scores, helped plans lessen cuts in enrollee benefits, which may explain the continued growth in Medicare Advantage enrollment. Reductions in federal payments have heretofore had a limited impact on enrollee benefits. However, if future benefit reductions are larger or passed on to beneficiaries through more salient channels, then payment reductions may slow growth in enrollment.
Figure 1. Benchmarks, Bids, and Pass-through in Medicare Advantage

Note: This figure depicts the Medicare Advantage bidding system in 4 stages. First, the Centers for Medicare and Medicaid Services sets a county-specific maximum allowed payment rate for the average-risk beneficiary (benchmark). Second, plans consider the benchmark and submit a bid, which reflects their asking price for insuring the average risk beneficiary across all counties a plan chooses to operate in. Third, the relationship between the bid and the benchmark determines the final plan payment and pass-through (rebates or premium) offered to beneficiaries. Rebates include premium reductions and additional coverage such as vision, dental, and hearing. Finally, beneficiaries may enroll in Medicare Advantage by choosing among plans after considering the available options in terms of premiums or rebate offerings.
Figure 2. Benchmarks and Bids in Medicare Advantage

Panel A. shows national average levels of quality-adjusted benchmarks, benchmarks without quality adjustments, and bids in Medicare Advantage. Panel B shows quality-adjusted benchmarks and bids, divided by 2012 quartiles of Medicare FFS per capita spending. Both figures include all HMOs, local PPOs, and PFFS plans and are weighted by Medicare Advantage enrollment. Benchmarks that include quality adjustments are averages of the benchmarks faced by plans according to their quality rating. Both benchmarks and bids are adjusted for inflation using the consumer price index to year 2015.
Figure 3. Rebates and Enrollment in Medicare Advantage

Note: This figure shows national average levels of actual plan rebates and projected rebates from the 2010 Medicare Trustees’ Report (https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/ReportsTrustFunds/downloads/tr2010.pdf), showing that actual rebates declined less than projected post-ACA. The figure also includes total Medicare Advantage enrollment (in millions).
Figure 4. Marginal Change in Bid for Each Dollar Increase in Benchmark, by Year

Note: This graph plots marginal effects of changes in the benchmark on changes in plan bids, by year. The unit of observation is county-year, weighted by county-level enrollment averaged across the years. Standard errors are clustered at the county level.
Figure 5. Marginal changes from regressing rebates, premiums, and benefits on benchmarks, pre- and post-ACA

Note: This graph plots the marginal change in rebates, premiums, and benefits in response to a $1 change in the benchmark, before and after the Affordable Care Act (ACA). Regressions of benchmarks on Part D and Drug spending only include plans that offer Part D. Out-of-pocket costs reflect beneficiary spending on covered services, given plans’ cost sharing and covered benefits. Drug spending and spending on extra benefits reflect beneficiary spending after accounting for spending on pharmaceuticals and supplementary (vision, hearing, and preventative dental) benefits, respectively. Premiums and benefit data do not exist for 2006, so this year is omitted for all regressions in this figure.
Table 1. Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>Pre 2012</th>
<th>Post 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contract Characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benchmark ($)</td>
<td>947.95</td>
<td>874.02</td>
</tr>
<tr>
<td>Bid ($)</td>
<td>802.02</td>
<td>748.53</td>
</tr>
<tr>
<td>Rebate ($)</td>
<td>105.78</td>
<td>86.28</td>
</tr>
<tr>
<td>Estimated Payments to Plans ($)*</td>
<td>893.20</td>
<td>839.01</td>
</tr>
<tr>
<td><strong>Plan Characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Out-of-Pocket Costs**</td>
<td>171.11</td>
<td>220.46</td>
</tr>
<tr>
<td>Total Out-of-Pocket Drug Spending</td>
<td>66.19</td>
<td>98.75</td>
</tr>
<tr>
<td>Out-of-Pocket Spending on Extra Benefits</td>
<td>29.11</td>
<td>33.79</td>
</tr>
<tr>
<td>Plan Premiums</td>
<td>25.81</td>
<td>27.88</td>
</tr>
<tr>
<td>Part D Premiums</td>
<td>9.32</td>
<td>12.80</td>
</tr>
<tr>
<td>Part B Premium Buy Down</td>
<td>0.85</td>
<td>0.93</td>
</tr>
<tr>
<td><strong>Market Characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Insurers in a Plan’s Market</td>
<td>5.36</td>
<td>5.01</td>
</tr>
<tr>
<td>Insurer HHI</td>
<td>4129</td>
<td>4077</td>
</tr>
<tr>
<td>MA risk relative to FFS risk</td>
<td>0.96</td>
<td>0.99</td>
</tr>
<tr>
<td>Whether contract is an HMO</td>
<td>75%</td>
<td>0.70%</td>
</tr>
</tbody>
</table>

**Note:** Characteristics are risk-standardized for a beneficiary of 1.0 risk and adjusted for inflation using the consumer price index to year 2015. The unit of analysis is the plan. Contract characteristics are weighted by plan enrollment, market-level characteristics are not.

* Estimated payments to plans are risk-adjusted bids plus rebates

**Estimated out of pocket cost paid by a representative beneficiary in a plan.
Table 2. Changes in Bids and Rebates in Response to Changes in the Benchmark

<table>
<thead>
<tr>
<th>Dependent variable ($ PMPM)</th>
<th>(1) Bids</th>
<th>(2) Rebates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicare Benchmark</td>
<td>0.596**</td>
<td>0.272**</td>
</tr>
<tr>
<td></td>
<td>(0.036)</td>
<td>(0.033)</td>
</tr>
<tr>
<td>Post * Benchmark</td>
<td>-0.038**</td>
<td>0.007</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.012)</td>
</tr>
<tr>
<td>FFS per capita spending</td>
<td>-0.025</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td>(0.012)</td>
</tr>
<tr>
<td>Log MA Risk</td>
<td>-0.730**</td>
<td>0.339**</td>
</tr>
<tr>
<td></td>
<td>(0.180)</td>
<td>(0.138)</td>
</tr>
<tr>
<td>Log FFS Risk</td>
<td>0.558</td>
<td>-0.350</td>
</tr>
<tr>
<td></td>
<td>(0.306)</td>
<td>(0.209)</td>
</tr>
<tr>
<td>Number of insurers</td>
<td>-2.198**</td>
<td>2.089**</td>
</tr>
<tr>
<td></td>
<td>(0.532)</td>
<td>(0.399)</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>-1.634**</td>
<td>0.600</td>
</tr>
<tr>
<td></td>
<td>(0.655)</td>
<td>(0.631)</td>
</tr>
<tr>
<td>Per Capita Income ($1000s)</td>
<td>0.259</td>
<td>-0.086</td>
</tr>
<tr>
<td></td>
<td>(0.282)</td>
<td>(0.251)</td>
</tr>
<tr>
<td>County FE</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Year FE</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Observations</td>
<td>27,444</td>
<td>27,444</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.927</td>
<td>0.919</td>
</tr>
</tbody>
</table>

Note: This table shows coefficients of interest for the plan bid and rebate response prior to the ACA and after the ACA. The unit of observation is county-year, weighted by county-level enrollment averaged across the years. Standard errors in parentheses are clustered at the county level. After 2012, most plans bidding below the benchmark received a rebate that was 65-75% of the difference between their bid and the benchmark.
Table 3. Heterogeneity of the Bid Response and Rebate Response

### Panel A

<table>
<thead>
<tr>
<th></th>
<th>(1) Main estimates</th>
<th>(2) Higher competition</th>
<th>(3) Lower competition</th>
<th>(4) Low HHI</th>
<th>(5) High HHI</th>
<th>(6) Urban counties</th>
<th>(6) Rural counties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benchmark</td>
<td>0.596**</td>
<td>0.578**</td>
<td>0.686**</td>
<td>0.570**</td>
<td>0.719**</td>
<td>0.555**</td>
<td>0.820**</td>
</tr>
<tr>
<td></td>
<td>(0.036)</td>
<td>(0.037)</td>
<td>(0.047)</td>
<td>(0.037)</td>
<td>(0.048)</td>
<td>(0.035)</td>
<td>(0.034)</td>
</tr>
<tr>
<td>Benchmark *</td>
<td>-0.038**</td>
<td>-0.039**</td>
<td>0.033</td>
<td>-0.035**</td>
<td>-0.027</td>
<td>-0.031</td>
<td>-0.024</td>
</tr>
<tr>
<td>Post</td>
<td>(0.016)</td>
<td>(0.017)</td>
<td>(0.046)</td>
<td>(0.018)</td>
<td>(0.029)</td>
<td>(0.017)</td>
<td>(0.027)</td>
</tr>
<tr>
<td>Controls</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>County FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Year FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Observations</td>
<td>27,444</td>
<td>12,971</td>
<td>14,473</td>
<td>13,729</td>
<td>13,715</td>
<td>11,276</td>
<td>16,168</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.927</td>
<td>0.937</td>
<td>0.849</td>
<td>0.934</td>
<td>0.903</td>
<td>0.933</td>
<td>0.861</td>
</tr>
</tbody>
</table>

### Panel B

<table>
<thead>
<tr>
<th></th>
<th>(7) Main estimates</th>
<th>(8) Higher competition</th>
<th>(9) Lower competition</th>
<th>(10) Low HHI</th>
<th>(11) High HHI</th>
<th>(12) Urban counties</th>
<th>(13) Rural counties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benchmark</td>
<td>0.272**</td>
<td>0.289**</td>
<td>0.163**</td>
<td>0.303**</td>
<td>0.116**</td>
<td>0.309**</td>
<td>0.009</td>
</tr>
<tr>
<td></td>
<td>(0.033)</td>
<td>(0.033)</td>
<td>(0.055)</td>
<td>(0.032)</td>
<td>(0.039)</td>
<td>(0.031)</td>
<td>(0.022)</td>
</tr>
<tr>
<td>Benchmark *</td>
<td>0.007</td>
<td>0.005</td>
<td>-0.030</td>
<td>0.003</td>
<td>0.024</td>
<td>-0.001</td>
<td>0.013</td>
</tr>
<tr>
<td>Post</td>
<td>(0.012)</td>
<td>(0.013)</td>
<td>(0.039)</td>
<td>(0.014)</td>
<td>(0.022)</td>
<td>(0.013)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>Controls</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>County FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Year FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Observations</td>
<td>27,444</td>
<td>12,971</td>
<td>14,473</td>
<td>13,729</td>
<td>13,715</td>
<td>11,276</td>
<td>16,168</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.919</td>
<td>0.928</td>
<td>0.822</td>
<td>0.930</td>
<td>0.819</td>
<td>0.929</td>
<td>0.691</td>
</tr>
</tbody>
</table>

**Note:** This table examines heterogeneity of the bid response and rebate response by insurer competition. For the purposes of this analysis, we explore competition in three ways. First, counties are defined as higher- and lower-competition counties based on the number of insurers operating in those counties in 2012 (2 or fewer or more than 2). Counties with no insurers in 2012 are excluded from those regressions. Second, we calculated a measure of insurer competition in a county using the Herfindahl-Hirschman Index (HHI), and divided counties into high or lower competition based on median HHI in 2012 (HHI=5,473). Third, we looked at urban vs. rural counties, defined based on urban-rural continuum codes from the 2016 area resource file. Panel A has bids as the dependent variable. Panel B has rebates as the dependent variable.
Table 4. Decomposition of Changes in the Rebate

<table>
<thead>
<tr>
<th></th>
<th>Rebates (main)</th>
<th>Premiums</th>
<th>Out-of-Pocket Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benchmark</td>
<td>0.283**</td>
<td>-0.067**</td>
<td>-0.046**</td>
</tr>
<tr>
<td></td>
<td>(0.035)</td>
<td>(0.012)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>Benchmark * Post</td>
<td>0.003</td>
<td>-0.016**</td>
<td>0.007</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.006)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>Controls</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>County FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Year FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Mean of dep var</td>
<td>$84.31</td>
<td>$144.15</td>
<td>$25.28</td>
</tr>
<tr>
<td>Observations</td>
<td>24,870</td>
<td>24,870</td>
<td>24,870</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.929</td>
<td>0.926</td>
<td>0.909</td>
</tr>
</tbody>
</table>

Note: Regressions of benchmarks on Part D and Drug spending only include plans that offer Part D. Out-of-pocket costs reflect beneficiary spending on covered services, given plans’ cost sharing and covered benefits. Drug spending and spending on extra benefits reflect beneficiary spending after accounting for spending on pharmaceuticals and supplementary benefits (vision, hearing, and preventative dental), respectively. Premiums and benefit data do not exist for 2006, so this year is omitted for all regressions in this table.
Table 5. Instrumenting for the Benchmark

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Benchmarks</td>
<td>Bids</td>
<td>Bids</td>
</tr>
<tr>
<td></td>
<td>First Stage</td>
<td>OLS</td>
<td>IV</td>
</tr>
<tr>
<td>A-only</td>
<td>-4.059**</td>
<td>0.616**</td>
<td>0.710**</td>
</tr>
<tr>
<td>Percentage</td>
<td>(1.310)</td>
<td>(0.037)</td>
<td>(0.248)</td>
</tr>
<tr>
<td>Benchmark</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controls</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>County FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Year FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Observations</td>
<td>27,444</td>
<td>27,444</td>
<td>27,444</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.958</td>
<td>0.926</td>
<td>0.774</td>
</tr>
<tr>
<td>F-statistic</td>
<td>1,618</td>
<td>552</td>
<td>639</td>
</tr>
</tbody>
</table>

Note: Column 1 is the first-stage regression of the percent of aged FFS beneficiaries in a county who are A-only on Medicare Advantage benchmarks, using all controls used in prior regressions, except for the number of insurers enrolled in a county. Column 2 is the OLS regression of benchmarks on bids, replicated here with the same controls as in Column 1. Column 3 is a regression of benchmarks on bids, instrumenting for the benchmark using the percentage of beneficiaries who are A-only.
### Table 6. Sensitivity Analyses

#### Panel A  
**Dependent variable: Bids ($ PMPM)**

<table>
<thead>
<tr>
<th></th>
<th>(1) Main estimates</th>
<th>(2) Omit FFS risk</th>
<th>(3) Omit MA risk</th>
<th>(4) Omit Competition</th>
<th>(5) No star benchmark</th>
<th>(6) Plan level: HMO</th>
<th>(7) Plan level: LPPO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Benchmark</strong></td>
<td>0.596**</td>
<td>0.594**</td>
<td>0.593**</td>
<td>0.620**</td>
<td>0.617**</td>
<td>0.632**</td>
<td>0.619**</td>
</tr>
<tr>
<td></td>
<td>(0.036)</td>
<td>(0.036)</td>
<td>(0.038)</td>
<td>(0.037)</td>
<td>(0.038)</td>
<td>(0.047)</td>
<td>(0.141)</td>
</tr>
<tr>
<td><strong>Benchmark * Post</strong></td>
<td>-0.038**</td>
<td>-0.037**</td>
<td>-0.046**</td>
<td>-0.046**</td>
<td>-0.051**</td>
<td>-0.102**</td>
<td>-0.050</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.015)</td>
<td>(0.017)</td>
<td>(0.017)</td>
<td>(0.022)</td>
<td>(0.030)</td>
<td>(0.093)</td>
</tr>
<tr>
<td>Controls</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>County FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Year FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Plan FE</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.927</td>
<td>0.927</td>
<td>0.926</td>
<td>0.926</td>
<td>0.924</td>
<td>0.903</td>
<td>0.858</td>
</tr>
<tr>
<td>Observations</td>
<td>27,444</td>
<td>27,444</td>
<td>27,444</td>
<td>27,444</td>
<td>27,444</td>
<td>11,146</td>
<td>4,137</td>
</tr>
</tbody>
</table>

#### Panel B  
**Dependent variable: Rebates ($ PMPM)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Benchmark</strong></td>
<td>0.272**</td>
<td>0.273**</td>
<td>0.274**</td>
<td>0.254**</td>
<td>0.221**</td>
<td>0.314**</td>
<td>0.256**</td>
</tr>
<tr>
<td></td>
<td>(0.033)</td>
<td>(0.033)</td>
<td>(0.033)</td>
<td>(0.033)</td>
<td>(0.043)</td>
<td>(0.035)</td>
<td>(0.121)</td>
</tr>
<tr>
<td><strong>Benchmark * Post</strong></td>
<td>0.007</td>
<td>0.006</td>
<td>0.011</td>
<td>0.017</td>
<td>0.003</td>
<td>0.036</td>
<td>-0.079</td>
</tr>
<tr>
<td></td>
<td>(0.012)</td>
<td>(0.012)</td>
<td>(0.013)</td>
<td>(0.014)</td>
<td>(0.011)</td>
<td>(0.019)</td>
<td>(0.072)</td>
</tr>
<tr>
<td>Controls</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>County FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Year FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Plan FE</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.919</td>
<td>0.919</td>
<td>0.918</td>
<td>0.916</td>
<td>0.913</td>
<td>0.906</td>
<td>0.762</td>
</tr>
<tr>
<td>Observations</td>
<td>27,444</td>
<td>27,444</td>
<td>27,444</td>
<td>27,444</td>
<td>27,444</td>
<td>11,146</td>
<td>4,137</td>
</tr>
</tbody>
</table>

**Note:** This table shows sensitivity analyses of the bid and rebate response. Panel A uses bids as the dependent variable. Panel B uses rebates as the dependent variable. Columns (1) and (8) replicate the base estimates from Table 2. Columns (2-3) and (9-10) omit FFS and Medicare Advantage risk, respectively, from the county-level model. Columns (4) and (11) omit the control variables reflecting the number of insurers operating in the county. Column (5) and (12) use a benchmark that does not include the influence of quality bonuses, given that plans could endogenously choose their star level. Columns (6-7) and (13-14) estimate the bid and rebate response using regressions at the plan level, rather than the county level, by plan type (LPPO denotes local PPO plans). Plan-level regressions are weighted by average-plan level enrollment, average over all years for which the plan operates under the same plan ID.
References


