Online Appendix (Not For Publication)

Public and Private Provision of Information in Market-Based Public Programs:
Evidence from Advertising in Health Insurance Marketplaces

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A Additional Discussion on the Model of Government Advertising and Private Advertising

Additional Policy Design Questions. Our model suggests that there are various circumstances when government advertising is welfare-enhancing. To determine the optimal level, however, one must notice that the optimal amount of government advertising depends on whether government and private advertising are substitutes or complements in consumer demand. If they are substitutes (complements), the cross partial derivative of consumer demand $\partial^2 q_{ij}(a_g, a_j)/\partial a_g \partial a_j$ will be negative (positive). Thus, the precise amount of government advertising depends on how it interacts with private advertising.

One natural question is whether the government should advertise by own or the government subsidize (or tax) private firms and consumers via $\overline{Sub}_{ij}$ and Sub_{ij}. For example, in one firm setting described above, the government can set the private and social benefit of advertising to be equal by setting $\overline{Sub}_{ij} = w_{ij} - P_j$ when $\lambda = 1$. However, the subsidy approach may not be sufficient if there are multiple firms competing each other. For example, government advertising may still be necessary if private advertising with business-stealing effects have limited market-expansion effects.

Signaling Channel of Advertising. We consider a specific way in which advertising affects demand in the model. In reality, however, advertising may influence demand in a different way. Specifically, private advertising may provide a signal about the advertiser's product quality as in Milgrom and Roberts (1986). It is not very clear how government advertising can address potential inefficiencies directly related to the signaling aspect of private advertising.[1] Nevertheless, as long as there are consumers who would benefit from purchasing a product whom information frictions

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[1] For example, if there are some firms that provide advertising not because of higher quality but because of a lower cost of advertising, advertising could induce consumers to buy products with potentially lower quality. Government advertising is likely unable to discourage advertising from low-quality firms.

kept outside the market, government advertising could still enhance welfare in an extensive margin. At the same time, private advertising may provide a signal about product quality, improving an allocation in the intensive margin.

Other Product Characteristics. Although we assume that product characteristics as given, it is important to consider the role of product characteristics. As illustrated by Decarolis, Polyakova and Ryan (2020), the equilibrium price is often different from the socially optimal price in a model with imperfect competition, which could be an additional source of inefficiency for the advertising level. Another interesting channel is that price may respond to both government and private advertising. This issue is especially relevant in insurance markets where consumers with different health risks often respond differently to changes in prices or advertising. If government advertising is targeted to consumers with low health risks, it could possibly lower the price and improve consumer welfare. The importance of such an effect depends on whether advertising can increase take-up of low cost consumers.

B Suggestive Evidence for Geographical Targeting of Advertising

We investigate how advertisement spending is correlated with DMA characteristics by estimating the following regression:

$$\ln(1+ad_{mt}^{k}) = \boldsymbol{X}_{mt}\boldsymbol{\gamma} + \xi_t + \varepsilon_{mt}. \tag{A1}$$

The dependent variable ad_{mt}^{k} represents advertising spending per capita by sponsor type $k \in \{f,s,p\}$, which is the federal government (f), state government (s), or private insurer (p). We take the log transformation to account for a skewed distribution of advertising spending and add one to the advertising variables before taking the logarithm because there are markets with zero advertising spending by the government or private insurers. Explanatory variables $\boldsymbol{X}_{mt}$ include various DMA-level characteristics considered in Table 1, some of which are *time-varying*. ξ_t refers to a year fixed effect. Although we are reluctant to view our estimates as causal, we aim to learn which market characteristics are associated with greater advertising spending by sponsor type.

Table A.1 presents estimates of the regression in equation (A1). Columns (1) and (2) report results for federal and state advertising, respectively. Column (3) presents results for all private advertising, and column (4) restricts private advertising to ACA-related content. We control for the number of insurers in a market to control for any mechanical increase in private advertising spending in markets with a greater number of insurers.

We find that government advertising is not particularly targeted based on DMA-level demographic characteristics, whereas private advertising varies much more with demographic characteristics and health care policies. For example, although both governments and private insurers do more advertising in larger markets, private advertising is much more responsive to the market size than either federal or state advertising.[2] Moreover, Medicaid expansion is associated with 76% ($\simeq 100 * (\exp(0.563) - 1)$) additional total private advertising. In contrast, federal advertising does not have the same relationship with Medicaid expansion.[3]

Unlike private advertising, government advertising is much less responsive to measures related to potential profitability, such as the market size and the Medicaid expansion status. This suggests that the government's advertising decision is based on factors that private insurers do not take into account. The government may want to reach out to a broad population including markets that are not very profitable for private insurers. Moreover, it may internalize negative externality of being uninsured such as the cost of uncompensated care for the uninsured (Finkelstein, Hendren and Shepard, 2019), the point discussed in section VI and Online Appendix G to completely characterize the welfare effect of federal advertising.

C Discussion of the Border Strategy

C.1 Characteristics of Border Counties

Differences between Pairs of Border Counties. Table A.3 compares market characteristics between border counties with low and high federal and state government and market-level private advertising spending. For each of the three types of advertising, we identify which border county within a border pair has a smaller expenditure. We collect such border counties with respect to federal, state, and private advertising spending for columns (1), (3), and (5), respectively. For even-numbered columns, we collect border counties with higher expenditures within border pairs.

The table shows that border counties with lower and higher advertising expenditures are very similar in terms of market characteristics except for advertising spending. First, the number of insurers selling marketplace plans, the degree of market concentration (measured by HHI), and the market size are very similar between border counties with low and high advertising spending.

[2]Larger markets may have more TV channels. This possibility could mechanically lead to more advertising in larger markets and positive coefficients for the market size in the regressions even in the absence of targeting. However, our goal is to compare the coefficient estimates between government advertising and private advertising. The potential mechanical relationship between advertising spending and the market size unlikely affect certain advertising sponsors disproportionately more.

[3]This result with respect to Medicaid could be due to the fact that the federal advertising do not provide local advertising whenever states are responsible for marketing. However, the federal government is still responsible for marketing in many states that expanded Medicaid. Even if we exclude markets in states responsible for own marketing, we have similar results.

Moreover, distributions of incomes and ages among potential enrollees are also very similar between the two groups of border counties. Employment rates, one of the statistics that predicts the size of the market size of marketplaces, are also almost identical between the two groups. Additionally, average health statuses measured by market-level shares of individuals with various health conditions are also almost identical between the two groups of border counties. Lastly, we also find that county-level average plan characteristics, such as premiums, the number of plans, and measures of plan generosity, are almost identical between the two groups. These results suggest that the identifying assumption is plausible. Moreover, these results suggest that the targeting of advertising we documented in section B is likely to be driven by non-border counties, which do not share advertising market borders.

Furthermore, We also show that variation of market characteristics between pairs of border counties over time is not associated with variation of advertising between pairs of border counties over time. We first run the ression of

$$x_{bct} = \sum_{k \in K} \ln(1 + ad^k_{bm(c)t})\beta_k + \xi_{bt} + \xi_c + \xi_{r(c)t} + \varepsilon_{bct}. \tag{A2}$$

This is similar to equation (6) but the dependent variables are (each element of) observed market characteristics x_{bct}. Table A.5 shows that most estimated coefficients of advertising are small and not statistically significant. Furthermore, even though some of the coefficients of advertising sponsor are statistically significant, the joint hypothesis testing including the individually significant estimates cannot reject the null that the three coefficients for the three advertising variables are all equal to zero.

We also look at the variation in product characteristics by estimating the following equation:

$$\ln(x_{jbct}) - \ln(s_{0bct}) = \sum_{k \in K} \ln(1 + ad^k_{jbm(c)t})\beta_k + \boldsymbol{x}_{bct}\boldsymbol{\gamma} + \xi_{jbt} + \xi_{jc} + \xi_{jr(c)t} + \Delta\xi_{jbct}. \tag{A3}$$

Again, it is similar to equation (9) but the dependent variables are (each element of) insurer's product characteristics x_{jbct}. Tables A.6 and A.7 show that most estimated coefficients of advertising are small and not statistically significant. As before, some of the coefficients of advertising sponsor are statistically significant. However, the joint hypothesis testing including the individually significant estimates cannot reject the null that the three coefficients for the three advertising variables are all equal to zero.

Overall, these findings are suggestive that our identifying assumption is reasonable.

Differences between Border and Non-Border Counties. An important caveat to the border strategy is that the estimated effect is only local to potential marketplace enrollees in border coun-

ties. Thus one must be cautious in generalizing the estimated effect to non-border counties). To ascertain how serious this issue is in our setting, we compare market-level characteristics between the border and non-border counties. Table A.4 presents market-level characteristics between the border and non-border counties. Although there are differences between the two groups of counties, the differences are small. For example, the differences in the number of insurers and HHIs do not exceed 10% of their unconditional averages. The distributions of ages and income groups are also similar between the border and non-border counties. Lastly, the differences in county-level health statuses and the differences in county-level averages of the plan characteristics considered in the table also do not exceed 10% of their unconditional averages. Thus, these findings suggest a significant overlap in observables between the border and non-border counties. This suggests that the estimated effect of advertising could be generalizable to even non-border counties.

Note that our finding only shows that border and non-border counties are not very different on average. Characteristics of non-border counties of neighboring DMAs can still be quite different and lead to differences in advertising exposures for border counties of neighboring DMAs.

C.2 Variation in Advertising in Border Analysis

One concern about the border strategy is that the extensive set of fixed effects employed by the strategy could leave very little variation in advertising spending. Thus, it is important to check whether the remaining variation in advertising is sufficiently large.

We report the county-level residual variation in federal advertising, state advertising, and county-level private advertising. We also report insurer-level residual variation in insurer-level private advertising. The county-level residual variation is obtained by regressing each of the three advertising variables on the fixed effects for border pair-by-year (ξ_{bt}), county (ξ_c), and rating area-by-year ($\xi_{r(c)t}$), which appear in equation (6). The insurer-level residual variation in private advertising is obtained by regressing insurer-level private advertising spending on the fixed effects for insurer-by-border pair-by-year (ξ_{jbt}), insurer-by-county ($\xi_{jr(c)t}$), and insurer-by-rating area-by-year (ξ_{jc}), which appear in equation (9).

Figure A.2 reports the distribution of these residuals, and column (1) of Table A.8 reports the ratio of the standard deviation of residual advertising spending to the unconditional mean of advertising spending. For each advertising sponsor type, there is a reasonable amount of variation in residual advertising spending. We find that the ratios range from 0.3 to 0.5, which are still sizable compared to the ratio of the standard deviation of the raw advertising spending to its unconditional mean in column (2). In the figure for insurer-level private advertising, a mass of insurers with zero advertising spending during the entire sample period results in a large spike at zero. However, the ratio for the insurer-level private spending is still larger than the ratios for most other advertising

types, which suggests that there is still a reasonable amount of variation in its residual advertising spending.

C.3 Additional Suggestive Evidence about the Validity of the Identification Assumption

A potential threat to the border identification strategy arises if other unobserved marketing activities are adjusted along the DMA border in a sophisticated way. We now examine the relationship between other marketing activities and advertising. We obtain the California state government's agent database for California's state marketplace (Covered California).[4] The first measure is the number of Certified Enrollment Counselors (CEC), who provide in-person counseling and assistance to consumers in need of help applying for Covered California programs. Another measure is the number of Certified Enrollment Entities (CEE), which are entities and organizations to provide in-person assistance to consumers in applying for Covered California health plans. The data provide information about the two measures at the zipcode x year level, and we aggregate them up to the county-year level. For our analysis, we calculate the number for CEC and CEE per capita by dividing them by the market size.

First, we regress these two measures on advertising, controlling for county and year fixed effects using counties in California. Thus, we are interested in how within-county changes in advertising by the CA state government are correlated with within-county changes in each of the two measures. Table A.9 reports the estimates. We find that the coefficient estimates of CA state advertising are very small and statistically insignificant for both CEC and CEE. Thus, this result suggests that other outreach activities are unlikely to bias our estimates of the effectiveness of advertising.

Further, we look at the variation of CEC and CEE in border counties in CA in Table A.10. We find that the variation in these two measures is very small between border counties with low and high advertising. We also confirm that these differences are not statistically significant at the 10 percent level. Thus, this result provides additional support to our identification assumption.

D Detailed Discussion of Effects of Advertising Content

In this section, we first discuss details of how we estimate the effect of advertising content on consumer demand and then document our findings. One difficulty in estimating content-level effects is that it is difficult to identify which particular content is effective because an advertisement often contains multiple types of content. Table A.2 in the Online Appendix shows which types of

[4]This data is used in Li and Tebaldi (2024). We thank to Honglin Li for helping us with obtaining this data.

content tend to be provided together. As discussed in section IV, there are many advertisements that feature both OE and FA content. In contrast, the other types of content–healthcare reform, being uninsured, and the penalty for not having health insurance–are much less likely to be provided along with OE or FA. Moreover, the other types of content do not tend to appear together in the same advertisement.

Based on these data patterns, we allow for the separate effect of the following four different types of advertising to reasonably isolate effects of content: (i) advertising that provides both OE and FA content; (ii) advertising that provides content on either OE or FA, but not both; (iii) advertising that provides the other types of content but not contents on OE or FA; (iv) advertising that provides no specific information on the marketplace. Note that there are no federal or state advertisements of type (iv) by definition. In contrast, about 60% of private advertisements did not provide any specific information on the marketplace, as shown in section IV.

Table A.17 in the Online Appendix presents coefficient estimates.[5] Column (1) reports estimates for a model, where we combine types (ii), (iii), and (iv) into one group while type (i) has its own effects. In column (2), we allow for each of the four types to have separate effects. We find that the coefficient estimates for federal advertising of type (i)–providing content about *both* OE and FA–are very large and statistically significant in both columns, suggesting complementarity between the two content categories for consumers. Column (1) shows that federal advertising other than type (i)–a combination of types (ii), (iii), and (iv)–has a much smaller estimate that is not statistically significant. Column (2) presents separate estimates for federal advertising of types (ii) and (iii), but neither of the two estimates is statistically significant. Note that as we include more advertising types in the model, we are likely left with less variation in advertising of each type, leading to larger standard errors. The relatively large standard errors for estimates in Table A.17 make it difficult to statistically distinguish whether certain types of content are more effective than others. At least, we can show from column (1) that federal advertising of type (i) is statistically greater than federal advertising of types (ii), (iii), and (iv) combined at the 10% significance level.[6] Overall, our results indicate that federal advertising that provides both OE and FA content played a major role in driving the market-expansion effect of federal advertising.

In contrast, the coefficient estimate for private advertising of type (i) is small and not statistically significant in either column. Based on the estimates in column (1), the estimate for private advertising of type (i) is statistically smaller than the estimate for federal advertising of type (i). Column (1) also shows that the coefficient estimate for non-type (i) private advertising is positive

[5]One potential concern about this specification is that because each advertisement enters the regression in the log, the four types of advertising variables do not sum up to the total advertising spending in the log. We also estimate a similar model with the level of each advertising variable as a robustness check. The results are not qualitatively different from the results from the main model and are reported in Table A.18.

[6]The standard error of the difference between the two coefficient estimates is 0.17 with a t-statistics of 1.32. However, we cannot reject the null hypothesis that the two coefficients are the same.

and statistically significant. Column (2) shows separate estimates for types (ii), (iii), and (iv), and we find that only private advertising of type (iv)–not providing any specific information about the marketplace–is statistically significant.

E Effect of Government Advertising on Insurer Choice

E.1 Interaction with Private Advertising

Government advertising could also affect an insurer's advertising spending if the effectiveness of private advertising depends on the government advertising. We now allow an interaction term between federal and private advertising in the demand model. The point estimates reported in Table A.22 in the Online Appendix are statistically insignificant and close to zero. This result indicates that the interaction between government and private advertising on the consumer demand is limited. Thus, private insurers may not adjust their advertising in response to government advertising, suggesting that government advertising has a limited crowding-out or crowding-in effects on private advertising.

E.2 Interaction with Plan Characteristics

Government advertising in our demand model is assumed to have only the extensive-margin effect. We now examine whether the effectiveness of advertising depends on the insurer's specific plan characteristics. For this purpose, we estimate the consumer demand model that includes the interaction between advertising and plan characteristics. To do so, we need to create data for insurer-level plan characteristics. For this purpose, we first utilize the CMS plan data to obtain the plan-level product characteristics. We obtain each plan's premium for an enrollee with age 30, financial characteristics (e.g., metal tier, generosity, deductible, and other cost-sharing parameters), and hospital network structure (whether the plan is PPO plan or HMO plan, and whether the plan provides coverage to the hospital care outside the county of residence, etc). We choose the deductible, out-of-pocket-maximum, and coinsurance variables from those associated with tier 1 in-network medical and drug essential health benefits because we have the least number of missing variables among those financial characteristics in our plan data. From these data, we create metal tier-specific plan characteristics at the insurer-county level by averaging each characteristic of plans offered by each insurer within a metal tier. This includes the premium, the plan generosity (within a metal tier), the number of different cost-sharing plans, the proportion of PPO plans, and the proportion of plans with out-of-county hospital coverage.

Using these insurer-metal tier plan-level variables, we estimate the consumer demand model

where the choice specific utility is now expressed as

$$u_{ijct} = \sum_{k \in K} \ln(1 + ad^{k}_{jm(c)t}) z^{M}_{jct} \beta_{zk} + z^{M}_{jct} \gamma_z + \xi_{jct} + \varepsilon_{ijct} \tag{A4}$$

where z^{M}_{jmt} is a vector of insurer j's plan characteristics in the market c in year t given the metal tier level M and a constant term. The parameters of our interest are the vector of coefficients β_{xk}. Note that our demand model incorporates a rich set of fixed effects, including the rating area×insurer×time fixed effects. However, we can still estimate the interaction terms because it is multiplied with advertising variables. Moreover, these plan characteristics may change within a rating area×insurer×time if insurers change the mix of insurance products offered at the county level. We estimate parameters using the border strategy. As we discuss in the main text, an insurer's plan characteristics look similar across borders. However, within the same border, different firms may offer different mix of product characteristics; moreover, different borders consist of a different mix of product characteristics. We exploit these cross sectional variation to identify the interaction term between advertising and product characteristics. We report parameter estimates in Tables A.23–A.25.

We find that the coefficient estimates of the interaction terms between advertising and plan characteristics, as reported in Tables A.23–A.25 in the Appendix, are mostly small quantitatively for federal and state advertising for bronze, silver, and gold plans. None of them are statistically significant. This result suggests that government advertising has limited effects on consumer choices of insurers within the marketplace.

F Detailed Discussion of Heterogeneous Effects

F.1 Heterogeneous Effects across Markets

First, we examine whether the effectiveness of advertising may depend on healthcare policies. We specifically focus on whether the effect of advertising depends on a state's Medicaid expansion status, which also drives targeting of advertising to some extent. We report in column (1) of Table A.19 in the Online Appendix that the coefficient of the interaction term between federal advertising and the Medicaid expansion status is large and statistically significant. It suggests possible complementarity between federal advertising and Medicaid expansion status.[7] We also find that the coefficient of the interaction term between private advertising and Medicaid expansion status is positive, but it is small and not significant. These results imply that advertising spending

[7] A caveat in interpreting these results is that there can be other factors that also affect the effectiveness of advertising between states with and without Medicaid expansion.

may not be necessarily larger in markets where advertising is more effective. This finding does not mean that advertising sponsors behave in a suboptimal way. Rather, they may target advertising based on per-enrollee profitability or social welfare weight, which may vary across markets.

F.2 Selection Effects of Advertising

In our main specification, we do not allow the effects of advertising to vary with consumer demographics. In this section, we examine heterogeneous effects across consumer types. These heterogeneous effects are important in health insurance markets because they may potentially affect the degree of adverse or advantageous selection.[8]

Unfortunately, our data do not provide information on enrollee-level health status. However, we can still examine whether the effect of advertising depends on a county-level health measure and whether the effect is different for consumers in different age and income groups. These demographic variables typically are highly correlated with health status.

Column (2) in Table A.19 presents the estimates for the specification that allows for interactions between advertising variables and whether a market is "unhealthy." As in section B, we use a county's share of individuals self-reporting poor or fair health as a measure of county-level health status. We define an "unhealthy" market as a market in the top quartile of self-reported poor or fair health, including all markets with greater than 21% of individuals reporting fair or poor health. We find that none of the coefficients of the interaction terms are significant, although the estimates are slightly noisy.

Then, we estimate equation (9) by allowing heterogeneous effects to vary by age and income using demographic group-level market share data. We consider two age groups and two-income groups: whether an individual age is at least 55 and whether an individual income is less than or equal to 250% of the FPL. To capture demand heterogeneity across demographic groups, all of the usual fixed effects are now interacted with each demographic group. This may capture that consumers in a different demographic group prefer a different mix of insurance plans offered by an insurer. Because we do not have a breakdown of market shares by age or income groups for CA or NY, we exclude the two states from the sample for this analysis.[9]

The main results are reported in Table A.20. We find that the coefficients for the interaction terms with demographic groups are relatively small and statistically insignificant, which is indica-

[8]For example, Handel (2013) and Handel, Kolstad and Spinnewijn (2019) argue that policies that affect consumer choice frictions have important equilibrium effects by changing the degree of adverse or advantageous selection if consumer choice frictions and their health types are correlated.

[9]Excluding the two states does not appear to change our results very much. We also estimated a model with interactions between the advertising variables and county-level demographic characteristics with the sample that includes CA and NY. As reported in Table A.21, the results are not qualitatively different from the results with demographic group-level market shares.

tive of limited heterogeneity across demographic groups.[10]

G Detailed Discussions of Welfare Effects of Federal Advertising

We now discuss how we calibrate the social surplus from enrolling a consumer. As mentioned in the main text, we assume that federal advertising uniformly increases the take-up of insurance by consumers, whose willingness to pay for insurance is above the price. To evaluate the social welfare term SS_{ijg} using our framework in section V.B, we assume that the utilitarian welfare function, i.e., $\omega_{ig} = 1$ for any consumers i. We also abstract from the subsidy for firms $\overline{Sub}_{ij}$.[11] Consequently, $SS_{ijy} = w_{ij} - C_{ij} + (1-\lambda)Sub_{ij}$.

Existing studies (e.g., Finkelstein, Hendren and Shepard, 2019, Polyakova and Ryan, 2019, and Tebaldi, 2024) find it difficult to accurately estimate the willingness to pay for insurance in the health insurance marketplaces. Often, they tend to find that the willingness to pay for marketplace plans is significantly lower than the actual cost of providing the plans and government spending. For example, Finkelstein, Hendren and Shepard (2019) show that the willingness to pay for health insurance of the marginal consumers is about \$103 per month, and the average willingness to pay among in-sample population who actually purchase health insurance is about \$133 per month.[12]

However, these willingness to pay is substantially lower than the claims cost: for example, the mean claim cost among in-sample population who purchase plans is \$366 per month, which is 2.7 times larger than the mean willingness to pay.[13] Finkelstein, Hendren and Shepard (2019) argue that this is mainly because even uninsured individuals are partially insured through uncompensated care, which the government may finance. Thus, the correct social welfare calculation must account for a reduction of uncompensated care in assessing the cost of insurance C_{ij}. They argue that the actual out-of-pocket cost of uninsured is just 20% of the total cost and that the rest of the cost is

[10] One natural question is whether this limited heterogeneity is due to statistical power from our data. To properly address this question, one must acquire individual-level data, which is currently very challenging for the federal marketplaces. However, the lack of this heterogeneity is certainly plausible. For example, Aizawa and Kim (2018) find in Medicare Advantage that consumers with certain characteristics (e.g., consumers with better cognitive ability) are more responsive to advertising, but many demographic characteristics, including income, are not associated with the effectiveness of advertising. Thus, one must obtain richer measurements for enrollment to further pursue this issue.

[11] Although the ACA introduces the risk adjustment system, it is an essentially a revenue neutral program (especially early years of the ACA) in that it subsidizes private insurers which attract costly consumers by taxing insurers which attract less costly consumers.

[12] See Figure 13 in Finkelstein, Hendren and Shepard (2019). The highest in-sample willingness to pay is \$162 and the marginal consumer's willingness to pay is \$103. With the linear demand curve, the average willingness to pay is \$132.5.

[13] We obtain this number from Figure 13 in Finkelstein, Hendren and Shepard (2019). The highest in-sample claim cost is \$399 and the marginal consumer's willingness to pay is \$333. With the linear cost curve, the average cost is \$366.

likely to be paid by the government. As a result, if an uninsured individual acquires insurance coverage, the government can potentially save $292.8 per month (i.e., 80% of $366), assuming that the cost of financing uncompensated care is the social cost of having an uninsured individual. Thus, the net cost of insuring one person through the marketplace would be $73.2 per month on average. Finally, we should account for the cost of premium subsidies Sub_{ij}, which was about $350 per month on average in Finkelstein, Hendren and Shepard (2019).

Given these estimates, the average *annual* social surplus will be

$$\int_i \sum_j SS_{ijg} dH(i) = (132.5 - 73.2 + (1-\lambda) \times 350) \times 12 \tag{A5}$$

Thus, as long as $\lambda < 1.131$, the social surplus is more than $160 annually. The precise estimate of λ is beyond scope of our paper because it is context specific. To benchmark the case, assume that $\lambda = 1$. Then the average social surplus is about $600, which suggests that additional federal advertising substantially increases the overall welfare.

H Comparing the Effectiveness of Federal Advertising with Other Forms of Government Outreach

We compare our estimates of the effect of federal advertising on market-level enrollment to the finding in Goldin, Lurie and McCubbin (2021), who evaluate the randomized experiment of sending a direct mailing (a reminder) between 2016 and 2017 to individuals who paid the tax penalty because they were uninsured in 2015. They find that such a reminder increases the probability of being insured (at least one month) by 0.85 percentage points, which reduces the probability of being uninsured by 2.7% in their sample. They also show that roughly two-thirds of the marginal individuals enrolled in the marketplace, which implies that the probability of being uninsured decreased by 1.8% through an increase in marketplace take-up. These changes are induced by receiving one direct mailing from the federal government, whose cost is typically estimated to be about $0.5–$1.0.

In our estimation sample, those who choose the outside option account for about 80% of the market size. About 75% of them are uninsured, and a quarter of them obtain off-marketplace health plans. For the purpose of this comparison, we assume that the marginal effect of federal advertising is identical regardless of insured status. Then, our estimate implies that doubling federal advertising will increase the total marketplace enrollment 0.2 pp on average and increase it by 0.4 p.p. in certain markets. Correspondingly, the uninsured rate decreases by 0.15 p.p. or up to 0.3 pp. This implies that the uninsured rate decreased by 0.25%. Now, our average federal advertising

spending per capita is \$0.32. Because roughly 60% of the population is uninsured, we can consider that these enrollment changes are induced by \$0.53 (0.32/0.6) spending of federal advertising per uninsured.

These back of envelope calculation suggests that the cost-effectiveness of TV advertising is between 20 % and 40 % to the direct mail experiment reported in Goldin, Lurie and McCubbin (2021).

I Role of Private Advertising

This section provide analysis whether the amount of private advertising is correlated with insurer's plan characteristics that are associated with consumer utility. First, we find that consumers tend to receive higher utility from insurers spending more on advertising in the context of our demand model even after subtracting the contribution of advertising to utility, as shown in column (1) of Table A.26. The regression the county$\times$Year fixed effect, so we are comparing utilities from insurers within the same market. One caution from this finding is that the utility backed out from our model includes the cost of choice frictions, and we cannot distinguish between the true utility from each insurer and the cost of choice frictions.

Then, we examine the relationship between an insurer's advertising and some of observed plan characteristics.[14] Table A.26 shows that an insurer's advertising spending is positively correlated with the number of plans offered and the network size (whether a plan is PPO) and the access of hospital outside the county (whether it covers out-of-county health care) within the Silver metal tier and within the same market. It is not correlated with the premium, suggesting that these benefits do not translate into higher premiums. We also find qualitatively similar results with Bronze and Gold plans, which are reported in Tables A.27 and A.28.

These results suggest a possible welfare gain through private advertising. Through private advertising, consumers may end up choosing insurers that provide more options; moreover, the broader hospital network size through the PPO may increase the consumer welfare and health relative to the narrow hospital network via HMO.[15] The latter is especially relevant in the ACA marketplace, where the network size in HMO plans is very limited (Shepard, 2022). Moreover, premiums of plans offered by insurers with more advertising are not higher, suggesting that consumers likely benefit from those additional coverage.

It is important to point out that the ultimate effect on social welfare depends on many features that are hard to assess. For example, PPO plans may induce excess health care spending. Further,

[14] We obtain plan characteristics information from the CMS.

[15] Abaluck et al. (2021) find that characteristics of plans that lower the consumer's mortality rate are correlated with the plan's network.

the welfare effect on hospital networks depends on many equilibrium features in health care markets as well (Ho and Lee, 2019). Moreover, consumers may instead benefit from having a smaller number of plans if it is costly for them to compare multiple plans or if insurers may strategically increase the number of plans to get attentions from consumers and charge higher premium (Brown and Jeon, 2020). However, as long as the welfare gain mentioned above outweighs the social cost, this private advertising can be a tool with which to induce an efficient allocation in the marketplace.

J Detailed Discussion of the Advertising Data

Identifying Advertisements Relevant for the Marketplace. We exploit detailed information in the database to identify which advertisements are related to marketplaces. Using Amazon Web Services, we transcribed each advertisement and examined its content based on keywords. As a result, we can identify whether an advertisement (i) is related to the marketplace, (ii) merely promotes a private insurer's brand, or (iii) is related to health insurance but not about the marketplaces (i.e. Medicare). In our analyses, we consider types (i) and (ii) and exclude type (iii).

Depending on advertisement sponsors, we use a slightly different algorithm to classify each advertisement into type (i), (ii), or (iii). First, for advertisements by the federal government, we initially select those with the HHS as their sponsor names.[16] Among this set, we identify marketplace related advertisements (type (i)) by checking the transcript for mentions of "HealthCare.gov." Because there are only about 100 distinct advertisements by the HHS, we verified our classification by watching individual advertisements. Type (ii) does not exist for federal advertising, and we exclude type (iii)–for example, advertisements in which HHS promotes Medicare.

Second, for advertising by state governments, we initially select those advertisements with sponsor names that match names of state marketplaces such as Covered California and New York State of Health. Among this set, we again identified marketplace related advertisements (type (i)) by checking advertisement transcripts and individual advertisement videos visually. Type (ii) advertisements from state governments do not exist, and we exclude type (iii) advertisements from state governments–for example, those about Children's Health Insurance Programs.

Third, for private advertising, we rely only on transcripts because it is not feasible to watch each of the thousands of distinct advertisements by private insurers. We first exclude advertisements with type (iii) keywords such as "Medicare Advantage," "Medicare Part D," "Medigap," and "employer-sponsored insurance." Among the remaining advertisements, we identify type (i) with keywords related to the marketplace such as "open enrollment" and "financial assistance." The remainder are classified as type (ii).

[16] We also checked whether there are other federal sponsors that would place marketplace-related advertisements. However, federal advertising seems to be done exclusively by the HHS.

Identifying Advertising Content. We use Amazon Web Services (AWS) to transcribe the video of each advertisement. AWS automatically translates transcripts of advertisements in Spanish into English. We then view a sample of advertisements and generate a list of keywords that characterize the contents of the advertisement. Each advertisement in the sample is then classified based on these keywords and a set of dummy variables indicating the presence of each type of content is generated. Although this approach is necessarily ad hoc, we find that it performs well in ex-post manual verification. The list of content types and keywords are shown below:

- Reform: This dummy variable is equal to one if an advertisement contains at least one of the following terms: "affordable care act", "new law", "health care law", "health care reform law", "health care reform", "new health care", "reform", "health care act", "recent changes in health care", "changes that are coming in the health care system", "health care changes", or "changes in our health care".

- Open Enrollment:. This dummy variable is equal to one if an advertisement contains at least one of the following terms: "open enrollment", "deadline","choose or change plan", "last day", "enrollment period", "registration period", "open registration", "enrollment is now open", "February fifteen", "fifteenth of February", "December fifteen", "fifteen of December", "march thirty", "December 15", "January thirty first", "enroll-a-thon". If advertising contains "open enrollment for state and county employees","April thirtieth", then we assign the dummy to take zero.

- Uninsured: This dummy variable is equal to one if an advertisement contains at least one of the following terms: "uninsured", "still need health insurance", or "existing condition".

- Penalty: This dummy variable is equal to one if an advertisement contains at least one of the following terms: "penalty", "penalties", "the fine", "required to have health insurance", "required by law", "requirement", "required to have".

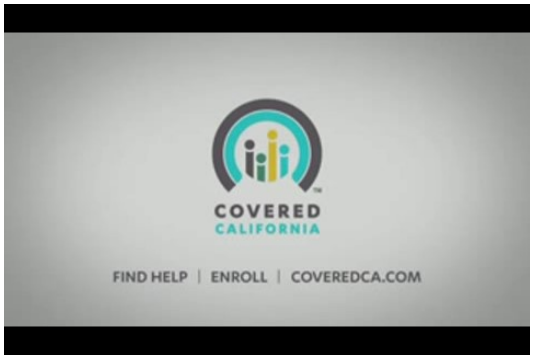
- Financial: This dummy variable is equal to one if an advertisement contains at least one of the following terms: "financial assistance", "financial help", "income information", "estimated income", "tax credit", "financial aid", "subsidy", "subsidies", "federal assistance", "government aid", "government to help", "money from the government", "qualify for assistance", "help pay", "help with their monthly payment", "eligible for money", "how much money you could get from the government", "government helping to pay", "federal help", "assistance to pay", "eligible for money", "getting money to help", "sum city", "financial health", "national assistance", "receive financial", "qualify for assistance", or "aid for your health insurance".

- ACA: this dummy variable is equal to one if at least one of dummy variables created above is equal to one.

K Additional Figures and Tables

Figure A.1: Screenshots of ACA-related Advertisements by Federal and State Governments and Private Insurers

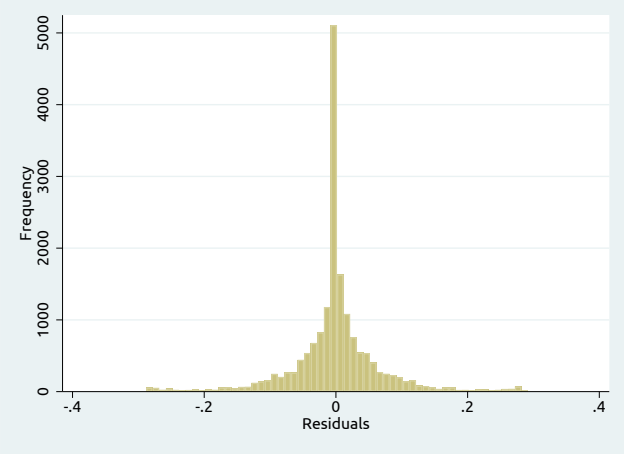
(a) Federal Government



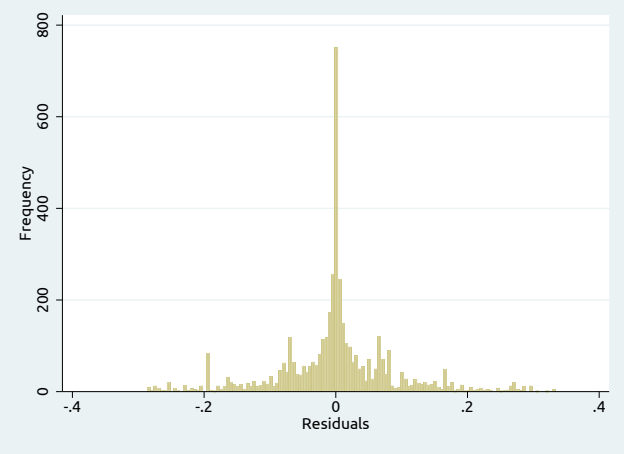
(b) California State Government

(c) Private Advertising (UnitedHealth)

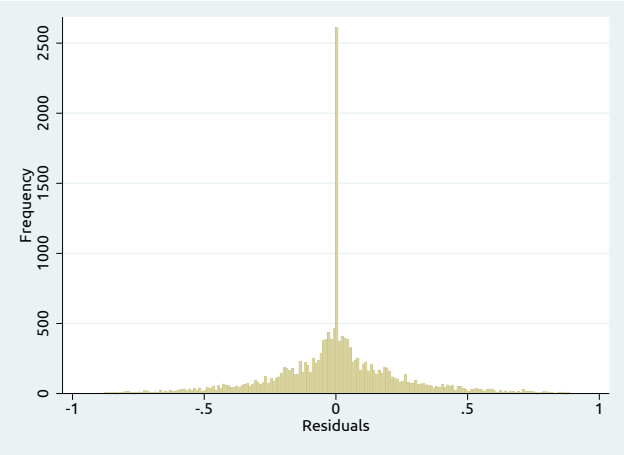
Figure A.2: Residual Variation in Advertising Variables



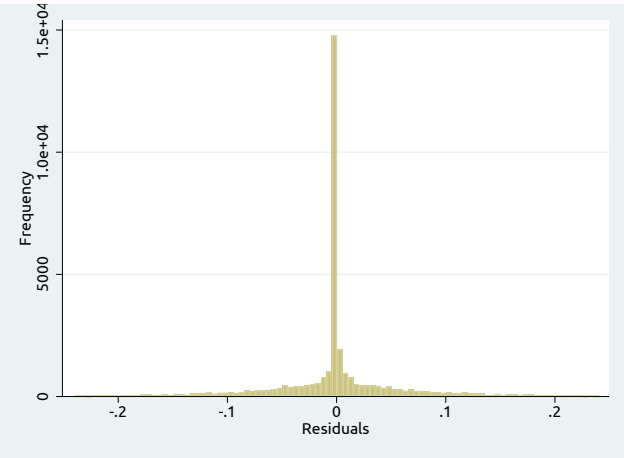
(a) Federal Ad



(b) State Ad



(c) Market-Level Private Ad



(d) Insurer-Level Private Ad

Note: This figure plots the distribution of residual variation in advertising spending by the federal and state governments (panels (a) and (b)) and private insurers at the market level and at the insurer-level (panels (c) and (d)). For panel (b), we excluded counties in states that delegated to the federal government the responsibility for marketing the marketplace because such counties do not have any variation on state advertising due to the institutional feature. Data source: Kantar Media.

Table A.1: Targeting of Advertising: Aggregate Results

	(1) Federal	(2) State	(3) Private (All)	(4) Private (ACA)
Share: Income $\leq$ 138% of FPL (%)	-0.009	-0.200	0.090	0.043
	(0.012)	(0.049)	(0.050)	(0.020)
Medicaid Expanded=1	-0.102		0.570	0.164
	(0.058)		(0.227)	(0.094)
Medicaid Expanded=1 $\times$ Share: Income $\leq$ 138% of FPL (%)	0.018		-0.112	-0.028
	(0.015)		(0.057)	(0.027)
Share: Age from 35 to 64	-0.003	-0.099	0.045	0.012
	(0.006)	(0.043)	(0.024)	(0.010)
Share: Poor or Fair Health (%)	0.008	0.064	-0.045	-0.007
	(0.009)	(0.039)	(0.029)	(0.017)
Number of Insurers	0.019	0.138	0.052	0.017
	(0.007)	(0.026)	(0.017)	(0.008)
Log of Market Size	0.028	-0.004	0.139	0.070
	(0.008)	(0.046)	(0.023)	(0.012)
Year FE	Y	Y	Y	Y
N. Obs.	784	332	983	983
Adj. R^2	0.146	0.289	0.196	0.222

Note: This table reports estimates of the coefficients in equation (A1). Because there is no federal advertising spending in 2018, we restricted our sample years to 2014–2017 for Column (1). For Column (2), we restricted the sample to DMAs that include counties from states for which states are responsible for marketing the marketplace. For the same column, we do not include the dummy variable for Medicaid expansion because every state with positive advertisement spending expanded Medicaid. Standard errors are in parentheses and clustered at the DMA level.

Table A.2: Cross Tabulation Ad Content Types

	(1) Open Enrollment=1	(2) Financial Assitance=1	(3) Healthcare Reform=1	(4) Uninsured=1	(5) Penalty=1
Share: Open Enrollment	1.00	0.51	0.36	0.11	0.82
Share: Financial Assistance	0.65	1.00	0.39	0.74	0.83
Share: Healthcare Reform	0.18	0.16	1.00	0.29	0.24
Share: Uninsured	0.03	0.14	0.13	1.00	0.09
Share: Penalty	0.20	0.16	0.11	0.10	1.00
N. Obs.	485,656	612,937	283,022	101,405	149,782

Note: This table reports cross tablutation of content types of advertisements by all sponsors during 2014–2018. Each column reports the share of different content types within advertisements that provide a specific content type. The unit of observation is each advertisement occurence, and reported numbers are averages weighted by each advertisement's dollar cost.

Table A.3: Comparing Either Side of Border Pairs

	Federal Ad		State Ad		Priv Ad	
	(1)	(2)	(3)	(4)	(5)	(6)
	Low	High	Low	High	Low	High
Federal Spend	0.227	0.582	0.266	0.177	0.243	0.275
	(0.202)	(0.497)	(0.374)	(0.180)	(0.329)	(0.377)
State Spend	0.161	0.100	0.515	1.462	0.205	0.269
	(0.489)	(0.448)	(0.845)	(1.246)	(0.652)	(0.776)
Private Spend	0.879	0.955	1.014	1.306	0.567	1.624
	(1.404)	(1.375)	(1.439)	(1.582)	(0.890)	(1.948)
Number of Insurers	2.552	2.553	2.863	2.903	2.494	2.521
	(1.458)	(1.488)	(1.379)	(1.413)	(1.422)	(1.439)
HHI among Insuers	0.704	0.713	0.667	0.660	0.714	0.711
	(0.243)	(0.245)	(0.238)	(0.234)	(0.243)	(0.244)
Log of Market Size	1.542	1.565	1.496	1.518	1.491	1.539
	(1.197)	(1.217)	(1.281)	(1.307)	(1.210)	(1.244)
Share: Income $\leq$ 138% of FPL	0.245	0.243	0.208	0.210	0.244	0.243
	(0.088)	(0.085)	(0.079)	(0.080)	(0.088)	(0.089)
Share: Age from 55 to 64	0.194	0.194	0.210	0.215	0.196	0.197
	(0.053)	(0.052)	(0.057)	(0.054)	(0.053)	(0.053)
Employment Rate	0.638	0.636	0.660	0.657	0.635	0.635
	(0.072)	(0.072)	(0.067)	(0.066)	(0.072)	(0.072)
Share: Poor or Fair Health	0.180	0.179	0.164	0.162	0.181	0.181
	(0.052)	(0.051)	(0.047)	(0.046)	(0.050)	(0.051)
Share: Obesity	0.320	0.319	0.299	0.297	0.319	0.318
	(0.041)	(0.040)	(0.041)	(0.043)	(0.042)	(0.043)
Share: Diabetes	0.118	0.118	0.106	0.106	0.118	0.118
	(0.023)	(0.023)	(0.020)	(0.020)	(0.024)	(0.024)
Healthcare Cost (in $1000s)	9.688	9.703	8.893	8.855	9.667	9.630
	(1.493)	(1.356)	(1.268)	(1.272)	(1.494)	(1.436)
Premium (Gold plans)	396.527	396.969	400.937	400.807	424.122	420.889
	(104.188)	(105.473)	(104.396)	(102.669)	(130.872)	(129.983)
Premium (Silver plans)	327.167	327.193	335.785	335.532	357.202	354.747
	(80.381)	(81.555)	(90.263)	(88.576)	(111.775)	(110.278)
Premium (Bronze plans)	268.511	268.504	273.315	273.055	285.928	284.003
	(70.586)	(72.909)	(77.212)	(74.788)	(85.594)	(84.425)
Number of Gold Plans	7.292	7.365	7.116	7.094	7.025	7.048
	(5.242)	(5.363)	(4.581)	(4.529)	(4.843)	(4.818)
Number of Silver Plans	28.316	28.714	23.383	22.936	27.040	27.106
	(18.296)	(18.875)	(12.773)	(12.278)	(18.384)	(18.203)
Number of Bronze Plans	10.654	10.710	10.198	10.066	10.187	10.181
	(5.035)	(5.123)	(4.697)	(4.546)	(5.133)	(5.160)
Share of PPO Plans (Gold plans)	0.452	0.450	0.463	0.471	0.447	0.444
	(0.374)	(0.372)	(0.372)	(0.365)	(0.375)	(0.373)
Share of PPO Plans (Silver plans)	0.459	0.458	0.463	0.472	0.450	0.448
	(0.368)	(0.366)	(0.369)	(0.363)	(0.371)	(0.371)
Share of PPO Plans (Bronze plans)	0.456	0.456	0.458	0.466	0.448	0.446
	(0.368)	(0.366)	(0.366)	(0.360)	(0.370)	(0.369)
Out-of-Pocket Max (Gold plans)	4,801.687	4,818.700	4,809.314	4,816.494	5,001.707	4,994.448
	(882.882)	(870.777)	(968.387)	(966.672)	(1,028.421)	(1,031.932)
Out-of-Pocket Max (Silver plans)	4,237.990	4,234.868	4,313.398	4,312.594	4,328.691	4,326.886
	(354.691)	(356.177)	(383.431)	(385.435)	(421.926)	(431.362)
Out-of-Pocket Max (Bronze plans)	6,565.988	6,566.887	6,550.065	6,552.507	6,609.072	6,612.031
	(259.392)	(260.512)	(267.131)	(270.316)	(286.004)	(287.507)
N. Obs.	4,758	4,758	2,181	2,181	8,496	8,496

Note: This table compares market characteristics between border counties with low and high federal, state and private advertising spending. For the first two columns, we collect border counties with lower federal advertising spending within each of border pairs in column (1) and border counties with higher federal advertising spending within each of border areas in column (2). We excluded border pairs with zero government advertising in both sides of borders from the sample used to produce the table. For columns (3) and (4), we group border counties similarly based on state advertising spending. For columns (5) and (6), we group border counties similarly based on market-level private advertising spending. Insurer plan characteristics are averaged at each county. See section E.2 for the description of plan characteristics. Standard errors are in parentheses.

Table A.4: Comparing Border and Non-Border Counties

	(1) Border Counties	(2) Non-Border Counties	(3) Overall
Number of Insurers	2.685	2.451	2.540
	(1.559)	(1.415)	(1.476)
HHI among Insuers	0.683	0.722	0.707
	(0.246)	(0.243)	(0.245)
Log of Market Size	8.754	8.376	8.521
	(1.623)	(1.241)	(1.412)
Share: Income $\leq$ 138% of FPL	0.229	0.240	0.236
	(0.082)	(0.087)	(0.085)
Share: Age from 55 to 64	0.187	0.197	0.193
	(0.051)	(0.054)	(0.053)
Employment Rate	0.656	0.637	0.644
	(0.070)	(0.073)	(0.072)
Share: Poor or Fair Health	0.166	0.180	0.175
	(0.049)	(0.051)	(0.051)
Share: Obesity	0.309	0.318	0.315
	(0.042)	(0.042)	(0.042)
Share: Diabetes	0.109	0.118	0.114
	(0.022)	(0.024)	(0.024)
Healthcare Cost (in $1000s)	9.543	9.638	9.602
	(1.522)	(1.470)	(1.491)
Premium (Gold plans)	424.081	430.258	427.853
	(138.735)	(137.895)	(138.250)
Premium (Silver plans)	355.547	361.636	359.274
	(115.702)	(115.051)	(115.338)
Premium (Bronze plans)	284.797	289.526	287.689
	(88.662)	(88.624)	(88.665)
Number of Gold Plans	6.802	6.926	6.878
	(4.414)	(4.831)	(4.674)
Number of Silver Plans	25.425	27.069	26.431
	(14.960)	(18.008)	(16.909)
Number of Bronze Plans	9.690	10.187	9.994
	(4.297)	(5.042)	(4.773)
Share of PPO Plans (Gold plans)	0.412	0.434	0.425
	(0.354)	(0.377)	(0.368)
Share of PPO Plans (Silver plans)	0.413	0.437	0.427
	(0.352)	(0.373)	(0.365)
Share of PPO Plans (Bronze plans)	0.409	0.435	0.425
	(0.351)	(0.372)	(0.364)
Out-of-Pocket Max (Gold plans)	5,002.583	5,030.970	5,019.916
	(1,035.385)	(1,029.857)	(1,032.065)
Out-of-Pocket Max (Silver plans)	4,371.662	4,348.599	4,357.546
	(403.924)	(425.862)	(417.624)
Out-of-Pocket Max (Bronze plans)	6,632.981	6,625.037	6,628.122
	(292.387)	(290.958)	(291.528)
N. Obs.	5,165	8,334	13,499

Note: This table presents market-level characteristics between border and non-border counties. Column (1) and (2) present characteristics of border and non-border counties, respectively. Column (3) present characteristics of all counties. Insurer plan characteristics are averaged at each county. See section E.2 for the description of plan characteristics. Standard errors are in parentheses.

Table A.5: County-level Regression-Based Balance Test

	(1) HHI among Insuers	(2) Share: Income $\leq$ 138% of FPL	(3) Share: Age from 55 to 64	(4) Employment Rate	(5) Share: Poor or Fair Health	(6) Share: Obesity	(7) Share: Diabetes	(8) Healthcare Cost (in $1000s)
Federal Spend	-0.006	-0.010	0.002	-0.005	-0.003	0.001	-0.000	0.002
	(0.011)	(0.005)	(0.003)	(0.005)	(0.003)	(0.002)	(0.001)	(0.056)
State Spend	0.009	0.005	-0.004	0.000	-0.006	0.001	0.001	-0.047
	(0.011)	(0.006)	(0.006)	(0.007)	(0.003)	(0.003)	(0.001)	(0.062)
Private Spend	-0.007	0.003	-0.002	-0.002	0.001	-0.001	-0.000	0.004
	(0.008)	(0.004)	(0.003)	(0.003)	(0.002)	(0.001)	(0.001)	(0.038)
F statistics	0.636	1.805	0.427	0.600	1.456	0.231	0.421	0.200
P-value for F stat	0.592	0.145	0.734	0.615	0.225	0.875	0.738	0.897
BorderYear FE	Y	Y	Y	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y	Y	Y	Y
RatingYear FE	Y	Y	Y	Y	Y	Y	Y	Y
N. Obs.	18,182	17,242	17,242	18,182	17,152	18,182	18,182	18,154
Adj. R^2	0.903	0.844	0.801	0.805	0.879	0.880	0.904	0.899

Note: This table presents the estimates of the regression of county characteristics on county-level advertising variables ($\log(1+ad)$). Standard errors are in parentheses and two-way clustered at the DMA $\times$ Year and the County level. F-statistics and their p-values for the test of whether all of the three estimates are equal to zero are also reported.

Table A.6: Firm-level Regression-Based Balance Test: Premium and Number of Plans

	(1) Premium (Gold plans)	(2) Premium (Silver plans)	(3) Premium (Bronze plans)	(4) Number of Gold Plans	(5) Number of Silver Plans	(6) Number of Bronze Plans
Fed Spend	0.122	0.015	0.194	0.021	-0.046	0.009
	(0.384)	(0.423)	(0.296)	(0.042)	(0.135)	(0.055)
State Spend	0.232	0.127	0.126	0.039	-0.108	0.078
	(0.423)	(0.386)	(0.299)	(0.052)	(0.208)	(0.051)
Priv Spend	0.431	0.536	0.570	-0.037	-0.068	-0.090
	(0.613)	(0.633)	(0.404)	(0.089)	(0.198)	(0.079)
F statistics	0.258	0.306	0.807	0.275	0.133	1.197
P-value for F stat	0.856	0.821	0.490	0.844	0.940	0.309
FirmBorderYear FE	Y	Y	Y	Y	Y	Y
FirmCounty FE	Y	Y	Y	Y	Y	Y
FirmRatingYear FE	Y	Y	Y	Y	Y	Y
N. Obs.	32,510	33,288	32,968	33,292	33,292	33,292
Adj. R^2	0.999	0.998	0.998	0.992	0.993	0.991

Note: This table presents the estimates of the regression of insurer characteristics on insurer-level advertising variables ($\log(1+ad)$). Standard errors are in parentheses and two-way clustered at the DMA $\times$ Year and the Firm $\times$ County level. F-statistics and their p-values for the test of whether all of the three estimates are equal to zero are also reported.

Table A.7: Firm-level Regression-Based Balance Test: Share of PPO Plans and Out-of-Pocket Maximum

	(1) Share of PPO Plans (Gold plans)	(2) Share of PPO Plans (Silver plans)	(3) Share of PPO Plans (Bronze plans)	(4) Out-of-Pocket Max (Gold plans)	(5) Out-of-Pocket Max (Silver plans)	(6) Out-of-Pocket Max (Bronze plans)
Fed Spend	0.002	0.001	0.002	1.831	1.348	0.643
	(0.003)	(0.003)	(0.003)	(4.826)	(1.381)	(0.573)
State Spend	0.006	0.000	-0.002	-1.570	3.241	0.188
	(0.005)	(0.003)	(0.002)	(4.471)	(2.254)	(0.428)
Priv Spend	0.003	0.002	0.002	13.240*	1.256	-0.697
	(0.005)	(0.004)	(0.004)	(7.204)	(2.095)	(1.017)
F statistics	0.651	0.133	0.558	1.362	1.054	0.525
P-value for F stat	0.583	0.941	0.643	0.252	0.368	0.665
FirmBorderYear FE	Y	Y	Y	Y	Y	Y
FirmCounty FE	Y	Y	Y	Y	Y	Y
FirmRatingYear FE	Y	Y	Y	Y	Y	Y
N. Obs.	32,510	33,288	32,968	32,112	33,036	32,826
Adj. R^2	0.995	0.996	0.997	0.997	0.998	0.999

Note: This table presents the estimates of the regression of insurer characteristics on insurer-level advertising variables ($\log(1+ad)$). Standard errors are in parentheses and two-way clustered at the DMA $\times$ Year and the Firm $\times$ County level. F-statistics and their p-values for the test of whether all of the three estimates are equal to zero are also reported.

Table A.8: Residual Variation in Advertising Variables

	(1) Residual Variation	(2) Raw Variation
Federal	0.43	1.06
State	0.51	2.67
Market-level Private	0.32	1.58
Insurer-level Private	0.44	1.99

Note: This table presents the variation in advertising spending by each sponsor. Column (1) reports the ratio of the standard deviation of residual adverting spending over the mean of unconditional advertising spending for each advertising sponsor. Column (2) reports the ratio of the standard deviation of unconditional advertising spending over the mean of unconditional advertising spending for each advertising.

Table A.9: Correlation between State Outreach and State Advertising

	(1) CEC Per Capita	(2) CEE Per Capita
State Spend	0.0778	-0.0206
	(0.1532)	(0.0412)
No. Insurers	-0.0207	-0.0024
	(0.0282)	(0.0082)
Market Size	-2.31e-07	1.35e-07
	(3.52e-07)	(6.10e-08)
Year FE	Y	Y
County FE	Y	Y
N. Obs	212	212
Adj. R^2	0.714	0.719

Note: This table presents the relationship between state advertising and state government outreach activities, measured by CEC per capita and CEE per capita. The unit of both measures is in thousands. The standard deviation of CEC per capita is 0.634, and the standard deviation of CEE per capita is 0.144. State Spend is the log of state advertising per capita plus one. The standard error is clustered at the DMA and year level.

Table A.10: Alternative Outreach Activities in Either Side of Border Pairs in CA

	State Ad		Priv Ad	
	(1)	(2)	(3)	(4)
	Low	High	Low	High
Certified Enrollment Counselors Per Capita (in 1000s)	0.782	0.760	0.787	0.730
	(0.548)	(0.679)	(0.615)	(0.622)
Certified Enrollment Entities Per Capita (in 1000s)	0.183	0.168	0.161	0.177
	(0.158)	(0.179)	(0.136)	(0.192)
N. Obs.	220	220	206	206

Note: This table compares alternative outreach activities done by the CA state government between border counties with low and high state and private advertising spending. For the first two columns, we collect border counties with lower state advertising spending within each of the border pairs in column (1) and border counties with higher state advertising spending within each border area in column (2). We excluded border pairs with zero government advertising in both sides of borders from the sample used to produce the table. For columns (3) and (4), we group border counties similarly based on market-level private advertising spending. Standard errors are in parentheses.

Table A.11: Market-Level Demand Analysis: Federal vs Non-federal Advertising

	(1) Log ($ln(1+ad)$)	(2) Level (ad)
Fed Spend	0.047	0.028
	(0.023)	(0.014)
Non-fed Spend	0.008	0.003
	(0.009)	(0.001)
No. of Insurers	0.014	0.015
	(0.009)	(0.009)
BorderYear FE	Y	Y
County FE	Y	Y
RatingYear FE	Y	Y
N. Obs.	18,182	18,182
Adj. R^2	0.915	0.916

Note: Non-fed Spend is the combined advertising spending by all sponsors other than the federal government: state governments, private insurers, navigators, Democrats, and Republics. Column (1) and (2) report estimates with the specifications, where the advertising variables enter in log and in level, respectively. In both columns, we can reject the null that the coefficient estimate for federal advertising is different from non-federal advertising at the 5% level. All specifications include Border$\times$Year fixed effects, County fixed effects, and Rating Area$\times$Year fixed effects. Standard errors are in parentheses and two-way clustered at the DMA$\times$Year level and the County level.

Table A.12: Reduced-Form Effect of Advertising on Insurer-Level Enrollment

	(1)	(2)	(3)
Fed Spend	0.093	0.093	0.096
	(0.049)	(0.049)	(0.049)
State Spend	-0.009	-0.014	-0.014
	(0.067)	(0.067)	(0.066)
Priv Spend	0.086	0.087	0.083
	(0.048)	(0.048)	(0.047)
Rival Spend	-0.047	-0.102	-0.106
	(0.044)	(0.049)	(0.049)
1[Num of Rivals with Positive Ads$\geq$2]=1 $\times$ Rival Spend		0.226	0.227
		(0.079)	(0.080)
1[Num of Rivals with Positive Ads$\geq$2]=1		-0.120	-0.121
		(0.064)	(0.063)
No. of Insurers	-0.085	-0.086	-0.084
	(0.020)	(0.021)	(0.021)
Navi Spend			-0.199
			(0.196)
Dem Spend			0.034
			(0.038)
Rep Spend			0.019
			(0.019)
FirmBorderYear FE	Y	Y	Y
FirmCounty FE	Y	Y	Y
FirmRatingYear FE	Y	Y	Y
N. Obs.	36,310	36,310	36,310
Adj. R^2	0.958	0.958	0.958

Note: This table reports estimates of effects of advertising on the log of insurer-level enrollment size. Each column reports estimates based on a different combination of advertising variables. Column (1) includes federal, state, private, and rival advertising. Column (2) includes adds the dummy of whether the number of rival advertisers is at least two, and its interaction with rival advertising. Column (3) adds navigator, Democrats and Republican advertising. All specifications include Firm$\times$Border$\times$Year fixed effects, Firm$\times$County fixed effects, and Firm$\times$Rating Area$\times$Year fixed effects. Standard errors are in parentheses and two-way clustered at the DMA$\times$Year level and the Firm$\times$County level.

Table A.13: Robustness: Market-Level Demand Analysis

	Log ($ln(1+ad)$)				Level (ad)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Federal Spend	0.045	0.042	0.043	0.043	0.026	0.025	0.026	0.026
	(0.022)	(0.021)	(0.022)	(0.022)	(0.014)	(0.013)	(0.013)	(0.013)
State Spend	-0.006	-0.004	0.007	0.007	0.002	0.003	0.007	0.007
	(0.035)	(0.035)	(0.041)	(0.042)	(0.016)	(0.016)	(0.016)	(0.016)
Private Spend	0.026	0.022	0.032	0.032	0.011	0.010	0.012	0.012
	(0.018)	(0.019)	(0.019)	(0.019)	(0.006)	(0.006)	(0.006)	(0.006)
1[Federal Spend>0]			0.247				0.251	
			(0.087)				(0.087)	
1[State Spend>0]			-0.019	-0.023			-0.020	-0.024
			(0.020)	(0.020)			(0.017)	(0.017)
1[Private Spend>0]			-0.010	-0.010			-0.005	-0.005
			(0.017)	(0.017)			(0.016)	(0.016)
Number of Insurers	0.014	0.014	0.014	0.013	0.015	0.015	0.015	0.014
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Sample	Baseline	Restricted to Same Rating Area	Baseline	Exluding Portland, OR	Baseline	Restricted to Same Rating Area	Baseline	Exluding Portland, OR
BorderYear FE	Y	Y	Y	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y	Y	Y	Y
RatingYear FE	Y	Y	Y	Y	Y	Y	Y	Y
N. Obs.	18,182	10,224	18,182	18,046	18,182	10,224	18,182	18,046
Adj. R^2	0.915	0.908	0.916	0.915	0.915	0.908	0.916	0.916

Note: Column (1) of this table reports the estimates reported in column (3) in Table 3. Columns (2) reports the estimates of the same specifications as in column (1), but with the sample that includes only border pairs in the same rating area. Column (3) reports the estimates of the specification that includes the dummy variables that equal to one if sponsor k ($k = f, s, mp$) has positive advertising spending. Column (4) uses the same specification as in column (3), but with the subsample that excludes Portland, Oregon. Columns (5) through (8) report the estimates of the specifications in columns (1) through (4), but we replace advertising variables $ln(1+ad)$ with the level ad. All specifications include Border$\times$Year fixed effects, County fixed effects, and Rating Area$\times$Year fixed effects. Standard errors are in parentheses and two-way clustered at the DMA$\times$Year level and the County level.

Table A.14: Robustness: Insurer-level Demand Analysis

	Log ($ln(1+ad)$)				Level (ad)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Federal Spend	0.123	0.119	0.121	0.122	0.068	0.066	0.068	0.068
	(0.054)	(0.053)	(0.054)	(0.054)	(0.032)	(0.031)	(0.032)	(0.032)
State Spend	0.012	0.027	0.023	0.001	-0.011	-0.003	-0.011	-0.016
	(0.070)	(0.068)	(0.086)	(0.086)	(0.031)	(0.031)	(0.033)	(0.033)
Private Spend	0.099	0.102	0.110	0.109	0.037	0.039	0.037	0.037
	(0.052)	(0.051)	(0.056)	(0.056)	(0.017)	(0.017)	(0.017)	(0.017)
1[Federal Spend>0]			0.376				0.374	
			(0.182)				(0.181)	
1[State Spend>0]			-0.020	-0.025			-0.005	-0.015
			(0.063)	(0.062)			(0.054)	(0.053)
1[Private Spend>0]			-0.015	-0.006			-0.001	0.008
			(0.037)	(0.037)			(0.035)	(0.035)
Number of Insurers	-0.080	-0.068	-0.081	-0.086	-0.079	-0.068	-0.080	-0.085
	(0.021)	(0.024)	(0.021)	(0.021)	(0.021)	(0.024)	(0.021)	(0.021)
Sample	Baseline	Restricted to Same Rating Area	Baseline	Exluding Portland, OR	Baseline	Restricted to Same Rating Area	Baseline	Exluding Portland, OR
FirmBorderYear FE	Y	Y	Y	Y	Y	Y	Y	Y
FirmCounty FE	Y	Y	Y	Y	Y	Y	Y	Y
FirmRatingYear FE	Y	Y	Y	Y	Y	Y	Y	Y
N. Obs.	36,246	19,712	36,246	35,740	36,246	19,712	36,246	35,740
Adj. R^2	0.940	0.925	0.940	0.940	0.940	0.925	0.940	0.940

Note: Column (1) of this table reports the estimates reported in column (3) in Table 3. Columns (2) reports the estimates of the same specifications as in column (1), but with the sample that includes only border pairs in the same rating area. Column (3) reports the estimates of the specification that includes the dummy variables that equal to one if sponsor k ($k = f, s, mp$) has positive advertising spending. Column (4) uses the same specification as in column (3), but with the subsample that excludes Portland, Oregon. Columns (5) through (8) report the estimates of the specifications in columns (1) through (4), but we replace advertising variables $ln(1+ad)$ with the level ad. All specifications include Firm×Border×Year fixed effects, Firm×County fixed effects, and Firm×Rating Area×Year fixed effects. Standard errors are in parentheses and two-way clustered at the DMA×Year level and the Firm×County level.

Table A.15: Additional Robustness Checks

	Market-level			Insurer-level		
	(1) $\ln(1+ad)$, Winsorized	(2) $\ln(ad)$ with Extensive Margins (No Portland, OR)	(3) Alternative Market Size Definition	(4) $\ln(1+ad)$, Winsorized	(5) $\ln(ad)$ with Extensive Margins (No Portland, OR)	(6) Alternative Market Size Definition
Fed Spend	0.047	0.011	0.041	0.130	0.034	0.115
	(0.023)	(0.006)	(0.019)	(0.055)	(0.014)	(0.053)
State Spend	-0.002	-0.004	0.005	0.023	0.006	0.026
	(0.036)	(0.012)	(0.034)	(0.071)	(0.027)	(0.075)
Priv Spend	0.025	0.006	0.030	0.093	0.017	0.115
	(0.018)	(0.003)	(0.017)	(0.056)	(0.011)	(0.050)
1[State Spend>0]		-0.024			-0.015	
		(0.029)			(0.060)	
1[Priv Spend>0]		0.013			0.058	
		(0.017)			(0.042)	
No. of Insurers	0.014	0.013	0.006	-0.080	-0.086	-0.092
	(0.009)	(0.009)	(0.008)	(0.021)	(0.021)	(0.020)
BorderYear FE	Y	Y	Y			
County FE	Y	Y	Y			
RatingYear FE	Y	Y	Y			
FirmBorderYear FE				Y	Y	Y
FirmCounty FE				Y	Y	Y
FirmRatingYear FE				Y	Y	Y
N. Obs.	18,182	18,046	18,182	36,246	35,740	36,310
Adj. R^2	0.915	0.915	0.926	0.940	0.940	0.939

Note: This table present the estimates with different log specifications of the advertising variables. Market-level regressions are reported in columns (1) to (3), and insurer-level regressions are reported in columns (4) to (6). Column (1) uses the baseline specification, but each advertising variable is winsorized at its 99 percentile. Column (2) uses the same specification as column (4) in Table 5 with the subsample that excludes Portland, Oregon. Column (3) uses market shares calculated with an alternative market size definition, where the market size is defined as the sum of the number of uninsured individuals and the number of marketplace enrollments. Columns (4) to (6) have the same specifications as columns (1) to (3). In columns (1) to (3), regressions include Border×Year fixed effects, County fixed effects, and Rating Area×Year fixed effects, and standard errors are in parentheses and two-way clustered at the DMA×Year level and the county level. In columns (4) to (6), regressions include Firm×Border×Year fixed effects, Firm×County fixed effects, and Firm×Rating Area×Year fixed effects, and standard errors are in parentheses and two-way clustered at the DMA×Year level and the Firm×county level.

Table A.16: The Effects of Advertising: New vs Mature Markets

	(1) Up to 2016	(2) Up to 2018	(3) Linear Trend
Fed Spend	0.131	0.123	0.119
	(0.059)	(0.054)	(0.066)
State Spend	0.107	0.012	0.033
	(0.094)	(0.070)	(0.084)
Priv Spend	0.160	0.099	0.076
	(0.068)	(0.052)	(0.058)
Linear Trend × Fed Spend			0.020
			(0.042)
Linear Trend × State Spend			-0.011
			(0.027)
Linear Trend × Priv Spend			0.022
			(0.019)
No. of Insurers	-0.091	-0.080	-0.079
	(0.024)	(0.021)	(0.021)
FirmBorderYear FE	Y	Y	Y
FirmCounty FE	Y	Y	Y
FirmRatingYear FE	Y	Y	Y
N. Obs.	24,836	36,246	36,246
Adj. R^2	0.944	0.940	0.940

Note: Columns (1) of this table presents the estimates with the sample period up to 2016; Column (2) presents the estimates with the full sample, which is up to 2018. Column (3) reports the estimates of the specifification that includes interactions between the linear time trend and each of federal, state, and private advertising spending. All specifications include Firm×Border×Year fixed effects, Firm×County fixed effects, and Firm×Rating Area×Year fixed effects. Standard errors are in parentheses and two-way clustered at the DMA×Year level and the Firm×County level.

Table A.17: Coefficient Estimates for Advertising Content (Log)

	(1)	(2)
Fed Spend:		
Open Enrollment and Financial	0.268	0.272
	(0.132)	(0.139)
Fed Spend:		
Not Both Open Enrollment And Financial	0.092	
	(0.060)	
Fed Spend:		
Either Open Enrollment or Financial (not both)		-0.102
		(0.217)
Fed Spend:		
Other ACA-related		0.113
		(0.066)
State Spend:		
Open Enrollment and Financial	0.103	0.141
	(0.101)	(0.104)
State Spend:		
Not Both Open Enrollment And Financial	-0.006	
	(0.072)	
State Spend:		
Either Open Enrollment or Financial (not both)		0.148
		(0.087)
State Spend:		
Other ACA-related		-0.076
		(0.081)
Priv Spend:		
Open Enrollment and Financial	0.069	0.091
	(0.067)	(0.073)
Priv Spend:		
Not Both Open Enrollment And Financial	0.104	
	(0.052)	
Priv Spend:		
Either Open Enrollment or Financial (not both)		0.094
		(0.073)
Priv Spend:		
Other ACA-related		-0.090
		(0.060)
Priv non-ACA Spend		0.130
		(0.058)
No. of Insurers	-0.079	-0.077
	(0.021)	(0.021)
FirmBorderYear FE	Y	Y
FirmCounty FE	Y	Y
FirmRatingYear FE	Y	Y
N. Obs.	36,246	36,246
Adj. R^2	0.940	0.940

Note: This table reports the estimates of the coefficients in specifications that include advertising content types. We use the log transformation of advertising spending in the estimation. The set of advertising content types considered in column (1) is: (i) advertisements that provide information about the open enrollment period and financial assistance and (ii) the rest of advertisements. The set of advertising content considered in column (2) is: (i) advertisements that provide information about the open enrollment period and financial assistance, (ii) advertisements that provide content about the open enrollment period or financial assistance, but not both, (iii) the rest of ACA-related advertisements, and (iv) non-ACA related advertisements. The non-ACA related advertisements only exist for private insurers because advertisements by the federal or state governments are ACA-related by definition. All specifications include Firm×Border×Year fixed effects, Firm×County fixed effects, and Firm×Rating Area×Year fixed effects. Standard errors are in parentheses and two-way clustered at the DMA×Year level and the Firm×County level.

Table A.18: Robustness Check: Coefficient Estimates for Advertising Content (Level)

	(1)	(2)
Fed Spend:		
Open Enrollment and Financial	0.225	0.235
	(0.098)	(0.101)
Fed Spend:		
Not Both Open Enrollment And Financial	0.053	
	(0.034)	
Fed Spend:		
Either Open Enrollment or Financial (not both)		-0.079
		(0.149)
Fed Spend:		
Other ACA-related		0.067
		(0.038)
State Spend:		
Open Enrollment and Financial	0.015	0.053
	(0.059)	(0.061)
State Spend:		
Not Both Open Enrollment And Financial	-0.015	
	(0.035)	
State Spend:		
Either Open Enrollment or Financial (not both)		0.088
		(0.054)
State Spend:		
Other ACA-related		-0.053
		(0.038)
Priv Spend:		
Open Enrollment and Financial	0.028	0.040
	(0.029)	(0.034)
Priv Spend:		
Not Both Open Enrollment And Financial	0.040	
	(0.017)	
Priv Spend:		
Either Open Enrollment or Financial (not both)		0.058
		(0.044)
Priv Spend:		
Other ACA-related		-0.038
		(0.028)
Priv non-ACA Spend		0.048
		(0.019)
No. of Insurers	-0.078	-0.075
	(0.021)	(0.022)
FirmBorderYear FE	Y	Y
FirmCounty FE	Y	Y
FirmRatingYear FE	Y	Y
N. Obs.	36,246	36,246
Adj. R^2	0.940	0.940

Note: This table reports the estimates of the coefficients in specifications that include advertising content types. We use the level of advertising spending in the estimation. The set of advertising content types considered in column (1) is: (i) advertisements that provide information aboutthe open enrollment period and financial assistance and (ii) the rest of advertisements. The set of advertising content considered in column (2) is: (i) advertisements that provide information about the open enrollment period and financial assistance, (ii) advertisements that provide content about the open enrollment period or financial assitance, but not both, (iii) the rest of ACA-related advertisements, and (iv) non-ACA related advertisements. The non-ACA related advertisements only exist for private insurers because advertisemnts by the federal or state governments are ACA-related by definition. All specifications include Firm×Border×Year fixed effects, Firm×County fixed effects, and Firm×Rating Area×Year fixed effects. Standard errors are in parentheses and two-way clustered at the DMA×Year level and the Firm×County level.

Table A.19: Heterogeneous Effects Depending on Market Characteristics

	(1) Market Characteristics = Medicaid Expansion	(2) Market Characteristics = Unhealthy Markets
Fed Spend	0.000	0.137
	(0.070)	(0.058)
Market Characteristic=1 × Fed Spend	0.220	-0.106
	(0.104)	(0.083)
State Spend	-0.010	0.035
	(0.084)	(0.072)
Market Characteristic=1 × State Spend	0.033	-0.171
	(0.118)	(0.160)
Priv Spend	0.076	0.093
	(0.096)	(0.055)
Market Characteristic=1 × Priv Spend	0.050	0.034
	(0.114)	(0.060)
No. of Insurers	-0.079	-0.079
	(0.021)	(0.021)
FirmBorderYear FE	Y	Y
FirmCounty FE	Y	Y
FirmRatingYear FE	Y	Y
N. Obs.	36,246	36,246
Adj. R^2	0.940	0.940

Note: This table reports the estimates for the specifications that include interaction terms between market characteristics and advertising variables. Column (1) reports the estimates for the specification with interaction terms between advertising variables and a dummy variable for Medicaid expansion status under the ACA. Note that there are counties in states without Medicaid expansion that had exposure to state advertising if these counties border with other states with Medicaid expansion. Column (2) reports the estimates for the specification with interaction terms between advertising variables and a dummy variable for "unhealthy" markets. A market is defined as unhealthy if the share of individuals with fair or poor self-reported health status in the market is greater than the 75th percentile (21%). All specifications include Firm×Border×Year fixed effects, Firm×County fixed effects, and Firm×Rating Area×Year fixed effects. Standard errors are in parentheses and two-way clustered at the DMA×Year level and the Firm×County level.

Table A.20: Heterogeneous Effects for Demographic Groups

	(1) Demo=Income$\leq$ 250% of FPL	(2) Demo=Age$\in$ [55,64]
Fed Spend	0.109	0.098
	(0.055)	(0.054)
State Spend	-0.038	-0.007
	(0.082)	(0.079)
Priv Spend	0.020	0.079
	(0.057)	(0.059)
Demo $\times$ Fed Spend	0.027	0.057
	(0.087)	(0.087)
Demo $\times$ State Spend	0.043	-0.026
	(0.123)	(0.137)
Demo $\times$ Priv Spend	0.054	-0.009
	(0.095)	(0.100)
No. of Insurers	-0.108	-0.124
	(0.021)	(0.022)
FirmBorderYearDemo FE	Y	Y
FirmCountyDemo	Y	Y
FirmRatingYearDemo FE	Y	Y
N. Obs.	67,622	67,686
Adj. R^2	0.919	0.914

Note: This table reports the estimates of the coefficients in the specification that includes interaction terms between advertising variables and dummy variables for individuals aged at least 55 and individuals with incomes below 138% of the federal poverty line FPL). For each column, we consider two demographic groups: whether or not an individual's age is at least 55 for column (1) and whether or not an individual's income is below 138% of the FPL for column (2). The unit of observation is at the level of each border pair, county, year, insurer, and demographic group. All specifications include Firm$\times$Border$\times$Year$\times$ Demographic Group fixed effects, Firm$\times$County$\times$ Demographic Group fixed effects, and Firm$\times$Rating Area$\times$Year$\times$ Demographic Group fixed effects. Standard errors are in parentheses and two-way clustered at the DMA$\times$Year level and the Firm$\times$County$\times$Demographic Group level.

Table A.21: Heterogeneous Effects Across Markets with Different Age and Income Group Compositions

	(1) Demo = Share of Income$\leq$ 250% of FPL	(2) Demo = Share of Age$\in$ [55, 64]
Fed Spend	0.123	0.136
	(0.056)	(0.058)
Demo $\times$ Fed Spend	0.004	0.046
	(0.039)	(0.048)
State Spend	0.007	0.033
	(0.078)	(0.078)
Demo $\times$ State Spend	0.027	-0.068
	(0.044)	(0.041)
Priv Spend	0.096	0.098
	(0.057)	(0.057)
Demo $\times$ Priv Spend	-0.014	-0.010
	(0.027)	(0.020)
No. of Insurers	-0.100	-0.101
	(0.025)	(0.025)
FirmBorderYear FE	Y	Y
FirmCounty FE	Y	Y
FirmRatingYear FE	Y	Y
N. Obs.	33,948	33,948
Adj. R^2	0.938	0.938

Note: This table reports the estimates of the coefficients in the specification that includes interaction terms between advertising variables and county-level demographic variables. The demographic variables we consider are the share of potential marketplace enrollee aged at least 55 for column (1), and the share of potential marketplace enrollees with incomes below 138% of the Federal Povery Level for column (2). The average shares (standard deviations) of the former and the latter are 0.20 (0.054) and 0.23 (0.085), respectively. All specifications include Firm$\times$Border$\times$Year fixed effects, Firm$\times$County fixed effects, and Firm$\times$Rating Area$\times$Year fixed effects. Standard errors are in parentheses and two-way clustered at the DMA$\times$Year level and the Firm$\times$County level.

Table A.22: Coefficient Estimates: Interaction between Federal and Private advertising

	(1) Log ($ln(1+ad)$)	(2) Level (ad)
Fed Spend	0.114	0.059
	(0.067)	(0.035)
State Spend	0.012	-0.011
	(0.070)	(0.031)
Priv Spend	0.092	0.029
	(0.055)	(0.018)
Fed Spend × Priv Spend	0.023	0.011
	(0.091)	(0.015)
No. of Insurers	-0.080	-0.080
	(0.021)	(0.021)
FirmBorderYear FE	Y	Y
FirmCounty FE	Y	Y
FirmRatingYear FE	Y	Y
N. Obs.	36,246	36,246
Adj. R^2	0.940	0.940

Note: This table reports the estimates of the coefficients for the specification includes the interaction term between federal and private advertising. The specification include Firm×Border×Year fixed effects, Firm×County fixed effects, and Firm×Rating Area×Year fixed effects. Standard errors are in parentheses and two-way clustered at the DMA×Year level and the Firm×County level.

Table A.23: Coefficient Estimates: Plan Characteristics (Bronze)

	(1) Characteristic = Num of plans	(2) Characteristic = Share of PPO plans	(3) Characteristic = Out-of-country cov.	(4) Characteristic = Premium	(5) Characteristic = Fin. Generosity	(6) Characteristic = Deductible	(7) Characteristic = Out-of-pocket max	(8) Characteristic = Coinsurance
Fed Spend	0.126	0.153	0.162	0.127	0.153	0.148	0.202	0.142
	(0.054)	(0.061)	(0.058)	(0.056)	(0.052)	(0.057)	(0.063)	(0.054)
Characteristic × Fed Spend	-0.020	-0.023	-0.057	-0.080	0.069	0.017	0.074	0.008
	(0.063)	(0.057)	(0.078)	(0.053)	(0.057)	(0.052)	(0.053)	(0.058)
State Spend	-0.017	-0.018	-0.003	0.003	-0.012	0.024	0.004	-0.023
	(0.076)	(0.079)	(0.076)	(0.074)	(0.074)	(0.080)	(0.074)	(0.082)
Characteristic × State Spend	-0.043	0.022	-0.004	0.056	0.045	0.048	0.021	0.046
	(0.052)	(0.066)	(0.062)	(0.075)	(0.040)	(0.052)	(0.042)	(0.072)
Priv Spend	0.101	0.122	0.045	0.113	0.083	0.079	0.104	0.096
	(0.057)	(0.067)	(0.057)	(0.059)	(0.056)	(0.061)	(0.057)	(0.060)
Characteristic × Priv Spend	-0.052	-0.062	0.125**	0.061	-0.039	-0.025	0.025	0.031
	(0.048)	(0.049)	(0.056)	(0.041)	(0.036)	(0.032)	(0.024)	(0.039)
Characteristic	0.133	-0.137	-0.320	-1.180	0.100	0.675	0.155	-0.449
	(0.070)	(0.121)	(0.279)	(0.253)	(0.092)	(0.300)	(0.145)	(0.262)
No. of Insurers	-0.105	-0.099	-0.100	-0.099	-0.099	-0.100	-0.100	-0.098
	(0.025)	(0.025)	(0.025)	(0.024)	(0.025)	(0.025)	(0.025)	(0.025)
FirmBorderYear FE	Y	Y	Y	Y	Y	Y	Y	Y
FirmCounty FE	Y	Y	Y	Y	Y	Y	Y	Y
FirmRatingYear FE	Y	Y	Y	Y	Y	Y	Y	Y
N. Obs.	33,228	32,904	32,904	32,904	32,904	31,338	32,762	31,616
Adj. R^2	0.938	0.939	0.939	0.940	0.939	0.940	0.939	0.940

Note: This table reports the estimates of the coefficients in specifications that include interactions between advertising and the average characteristics of bronze plans offered by each insurer. We normalized that each plan characteristic by subtracting its mean and standard deviation. All specifications include the number of insurers, the market size, and Firm×Border×Year fixed effects, Firm×County fixed effects, and Firm×Rating Area×Year fixed effects. Standard errors are in parentheses and two-way clustered at the DMA×Year level and the Firm×County level.

Table A.24: Coefficient Estimates: Plan Characteristics (Silver)

	(1) Characteristic = Num of plans	(2) Characteristic = Share of PPO plans	(3) Characteristic = Out-of-country cov.	(4) Characteristic = Premium	(5) Characteristic = Fin. Generosity	(6) Characteristic = Deductible	(7) Characteristic = Out-of-pocket max	(8) Characteristic = Coinsurance
Fed Spend	0.131	0.133	0.138	0.096	0.091	0.116	0.116	0.138
	(0.054)	(0.064)	(0.062)	(0.060)	(0.060)	(0.059)	(0.074)	(0.055)
Characteristic × Fed Spend	-0.047	-0.004	-0.017	-0.099	0.051	-0.024	-0.016	-0.028
	(0.048)	(0.060)	(0.085)	(0.065)	(0.057)	(0.053)	(0.067)	(0.038)
State Spend	-0.035	-0.033	-0.017	-0.016	-0.007	-0.036	-0.015	-0.061
	(0.074)	(0.083)	(0.077)	(0.075)	(0.076)	(0.078)	(0.076)	(0.083)
Characteristic × State Spend	-0.083	0.027	-0.004	0.017	-0.029	0.040	0.086	0.129
	(0.056)	(0.070)	(0.063)	(0.067)	(0.039)	(0.069)	(0.053)	(0.123)
Priv Spend	0.116	0.144	0.051	0.117	0.104	0.050	0.118	0.074
	(0.059)	(0.068)	(0.058)	(0.058)	(0.057)	(0.064)	(0.058)	(0.059)
Characteristic × Priv Spend	-0.095	-0.082	0.130	0.054	-0.025	-0.048	0.066	0.101
	(0.043)	(0.050)	(0.057)	(0.035)	(0.023)	(0.037)	(0.032)	(0.048)
Characteristic	0.248	-0.176	-0.383	-1.094	0.189	0.085	-0.031	-0.149
	(0.094)	(0.121)	(0.329)	(0.220)	(0.119)	(0.090)	(0.189)	(0.190)
No. of Insurers	-0.106	-0.105	-0.106	-0.105	-0.106	-0.106	-0.107	-0.106
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.029)	(0.025)	(0.029)
FirmBorderYear FE	Y	Y	Y	Y	Y	Y	Y	Y
FirmCounty FE	Y	Y	Y	Y	Y	Y	Y	Y
FirmRatingYear FE	Y	Y	Y	Y	Y	Y	Y	Y
N. Obs.	33,228	33,224	33,224	33,224	33,224	25,368	32,972	25,444
Adj. R^2	0.939	0.938	0.938	0.939	0.938	0.946	0.938	0.946

Note: This table reports the estimates of the coefficients in specifications that include interactions between advertising and the average characteristics of silver plans offered by each insurer. We normalized that each plan characteristic by subtracting its mean and standard deviation. All specifications include the number of insurers, the market size, and Firm×Border×Year fixed effects, Firm×County fixed effects, and Firm×Rating Area×Year fixed effects. Standard errors are in parentheses and two-way clustered at the DMA×Year level and the Firm×County level.

Table A.25: Coefficient Estimates: Plan Characteristics (Gold)

	(1) Characteristic = Num of plans	(2) Characteristic = Share of PPO plans	(3) Characteristic = Out-of-country cov.	(4) Characteristic = Premium	(5) Characteristic = Fin. Generosity	(6) Characteristic = Deductible	(7) Characteristic = Out-of-pocket max	(8) Characteristic = Coinsurance
Fed Spend	0.139	0.137	0.142	0.111	0.130	0.124	0.122	0.124
	(0.058)	(0.064)	(0.062)	(0.058)	(0.054)	(0.056)	(0.064)	(0.050)
Characteristic × Fed Spend	-0.005	0.001	-0.013	-0.098	-0.036	0.041	-0.024	-0.023
	(0.047)	(0.060)	(0.086)	(0.067)	(0.075)	(0.070)	(0.066)	(0.060)
State Spend	-0.020	-0.040	-0.029	-0.029	-0.029	-0.012	-0.012	-0.016
	(0.075)	(0.086)	(0.077)	(0.075)	(0.075)	(0.090)	(0.075)	(0.095)
Characteristic × State Spend	-0.067	0.022	0.005	-0.010	-0.044	0.171	0.084	0.055
	(0.048)	(0.071)	(0.062)	(0.065)	(0.053)	(0.110)	(0.059)	(0.109)
Priv Spend	0.141	0.150	0.063	0.129	0.108	0.100	0.125	0.120
	(0.060)	(0.069)	(0.059)	(0.061)	(0.058)	(0.071)	(0.060)	(0.072)
Characteristic × Priv Spend	-0.077	-0.083	0.121	0.064	-0.027	-0.009	0.053	0.091
	(0.026)	(0.051)	(0.056)	(0.038)	(0.023)	(0.014)	(0.036)	(0.047)
Characteristic	0.134	-0.158	-0.442	-0.863	0.293	-0.180	0.198	0.319
	(0.085)	(0.112)	(0.388)	(0.210)	(0.129)	(0.096)	(0.093)	(0.337)
No. of Insurers	-0.107	-0.096	-0.098	-0.098	-0.098	-0.109	-0.097	-0.108
	(0.025)	(0.024)	(0.024)	(0.024)	(0.024)	(0.029)	(0.024)	(0.029)
FirmBorderYear FE	Y	Y	Y	Y	Y	Y	Y	Y
FirmCounty FE	Y	Y	Y	Y	Y	Y	Y	Y
FirmRatingYear FE	Y	Y	Y	Y	Y	Y	Y	Y
N. Obs.	33,228	32,470	32,470	32,470	32,470	18,658	32,072	18,734
Adj. R^2	0.939	0.939	0.939	0.940	0.939	0.946	0.939	0.946

Note: This table reports the estimates of the coefficients in specifications that include interactions between advertising and the average characteristics of gold plans offered by each insurer. We normalized that each plan characteristic by subtracting its mean and standard deviation. All specifications include the number of insurers, the market size, and Firm×Border×Year fixed effects, Firm×County fixed effects, and Firm×Rating Area×Year fixed effects. Standard errors are in parentheses and two-way clustered at the DMA×Year level and the Firm×County level.

Table A.26: Correlation between Private Advertising and Mean utility and between Private Advertising and Plan Characteristics for Silver Plans

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Utility	0.114							
	(0.015)							
Number of Plans		0.088						0.075
		(0.018)						(0.016)
Share of PPO Plans			0.074					0.070
			(0.022)					(0.020)
Share of Plans with Out-of-Country Coverage				0.046				0.033
				(0.019)				(0.016)
Premium					-0.022			-0.033
					(0.023)			(0.029)
Financial Generosity						0.065		0.047
						(0.017)		(0.015)
Out-of-Pocket Max							-0.035	0.003
							(0.024)	(0.021)
County X Year FE	Y	Y	Y	Y	Y	Y	Y	Y
N. Obs.	30,812	27,849	27,847	27,847	27,847	27,847	27,547	27,547
Adj. R^2	0.152	0.113	0.087	0.063	0.044	0.073	0.044	0.176

Note: Each column reports the estimated coefficient of insurer-level characteristics on insurer's advertising, controlling for county×year fixed effects. Column (1) reports the coefficient of the mean utility net of utility effects from any types of advertising. Column (2) to (8) report the coefficient of plan characteristics of Silver plans. The regressors are normalized by dividing the original variables by their standard deviations. The coefficient estimate measures how a standard-deviation change of a regressor is correlated with advertising. Standard errors are clustered at the insurer level and the county×year level. Results for other metal tier plans are reported in the Online Appendix.

Table A.27: Correlation between Private Advertising and Plan Characteristics for Bronze Plans

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Number of Plans	0.074						0.069
	(0.016)						(0.014)
Share of PPO Plans		0.070					0.073
		(0.022)					(0.019)
Share of Plans with Out-of-Country Coverage			0.046				0.043
			(0.019)				(0.016)
Premium				-0.028			-0.052
				(0.024)			(0.032)
Financial Generosity					-0.013		-0.013
					(0.022)		(0.017)
Out-of-Pocket Max						-0.001	0.036
						(0.039)	(0.034)
County X Year FE	Y	Y	Y	Y	Y	Y	Y
N. Obs.	27,849	27,452	27,452	27,452	27,452	27,260	27,260
Adj. R^2	0.097	0.086	0.066	0.049	0.047	0.040	0.158

Note: Each column reports the estimated coefficient of insurer-level plan characteristics of bronze plans on insurer's advertising. The regressors are normalized by dividing the original variables by their standard deviations. The coefficient estimate measures how a standard-deviation change of a regressor is correlated with advertising. Standard errors are clustered at the insurer level and the county$\times$year level.

Table A.28: Correlation between Private Advertising and Plan Characteristics for Gold Plans

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Number of Plans	0.087						0.070
	(0.014)						(0.015)
Share of PPO Plans		0.079					0.072
		(0.023)					(0.020)
Share of Plans with Out-of-Country Coverage			0.049				0.032
			(0.019)				(0.015)
Premium				0.010			-0.015
				(0.022)			(0.021)
Financial Generosity					0.021		-0.001
					(0.023)		(0.019)
Out-of-Pocket Max						-0.054	-0.033
						(0.020)	(0.018)
County X Year FE	Y	Y	Y	Y	Y	Y	Y
N. Obs.	27,849	27,078	27,078	27,078	27,078	26,586	26,586
Adj. R^2	0.114	0.094	0.067	0.044	0.048	0.059	0.166

Note: Each column reports the estimated coefficient of insurer-level plan characteristics of gold plans on insurer's advertising. The regressors are normalized by dividing the original variables by their standard deviations. The coefficient estimate measures how a standard-deviation change of a regressor is correlated with advertising. Standard errors are clustered at the insurer level and the county$\times$year level.

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