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ABSTRACT

A major provision of the Affordable Care Act was the creation of Health Insurance Marketplaces, which began operating for the 2014 plan year. Although enrollment initially grew in these markets, enrollment has fallen recently amid insurer exits and rising premiums. To better understand these markets, we estimate premium elasticity of demand for Marketplace plans, using within-plan premium changes from 2014 to 2015, accounting for state-specific trends and simultaneous changes in generosity. Our preferred estimate implies that a one percent premium increase reduces plan-specific enrollment by 1.7 percent. We argue that this high elasticity reflects the rapid growth and high churn in this market, as well as the high degree of standardization and the availability of many close substitutes.

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A major provision of the Affordable Care Act (ACA) was the creation of Health Insurance Marketplaces, online portals for individual, private health insurance that began operating for the 2014 plan year. The Marketplaces differ from other insurance markets because they display through a single portal all products from all insurers offering Qualified Health Plans, with standardized information on premiums and benefits. Marketplace enrollment totaled eight million customers in 2014, and rose to 11.7 million in 2015 and 12.7 million in 2016. In 2017, enrollment fell to 12.2 million as premiums rose dramatically, and several insurers exited, leaving many markets with limited competition.[11] These changes have been central political and policy issues in the United States.

We estimate the premium elasticity of demand for Marketplace plans using newly available data on enrollment and premiums. This elasticity is important for understanding recent changes in the Marketplaces, and for improving our understanding of consumer price sensitivity in the individual coverage market. High elasticities imply low optimal premiums, but they may make it difficult for firms to recover their fixed costs, and could thus lead to firm exit. Using a within-plan identification strategy to account for unobserved plan quality, we estimate that a 1 percent increase in the premium net of any tax credits lowers demand by 1.7%, higher than previously estimated demand elasticities for health insurance. We argue that this high elasticity reflects rapid growth and high churn in this market, as well as the high degree of standardization and the availability of many close substitutes.

Most prior ACA research has shown only indirect evidence on premium sensitivity. For example, consumers choose low premium plans (Gabel et al., 2017); informational nudges about potential savings from switching plans make consumers more likely to make an active choice

[1] See https://www.cms.gov/Newsroom/MediaReleaseDatabase/Fact-sheets/2017-Fact-Sheet-items/2017-03-15.html.

(Ericson, Kingsdale, Layton, & Sacarny, 2017); and consumers are more likely to switch from a plan when its premium increases (HHS Office of the Assistant Secretary for Planning and Evaluation Office of Health Policy, 2017). DeLeire and Marks (2015) estimate a premium elasticity of demand for Marketplace plans, but do not account for unobserved plan quality. Tebaldi (2016) also estimates demand for Marketplace plans in California, finding much higher elasticities for young people than for old. Our results complement this work, as we use an alternative identification strategy, and estimate demand for all states using healthcare.gov.

I. Background on the Health Insurance Marketplaces

Under the ACA, insurers must charge the same premium to all customers, regardless of health status. However, premiums vary by age, by tobacco use status, and by geographic rating areas (GRAs, typically clusters of counties). Insurers may offer plans in all counties in a state, or only in a subset. The ACA standardizes plans by requiring that they must cover a consistent set of benefits, with limits on annual out-of-pocket maxima, and no limit on lifetime benefits. The Marketplace further standardizes the display of benefit information: plans are categorized into four metal tiers of increasing generosity based on actuarial value: bronze, silver, gold, and platinum. A "catastrophic" plan is also available to younger persons. The Marketplace interface highlights metal level, plan deductibles, copayments, coinsurance, and premiums.

The ACA created two types of subsidies for health care: the premium tax credit (PTC) and cost-sharing reduction (CSR) subsidies. The PTC is a subsidy to make insurance affordable, an important consideration because the ACA also included a mandate to buy insurance, with a tax penalty for non-compliance. The amount of the credit depends on household income and on the premium of the benchmark silver plan in that household's county; it does not depend on which plan the consumer eventually chooses. Thus, PTCs do not affect plan choice because they do not affect plans' relative premiums; the PTC only affects whether consumers purchase any coverage at all. The CSR subsidy reduces copayments and deductibles for households below 250 percent of the Federal Poverty Level, but only for those choosing silver plans. The Marketplace displays customer-specific premiums and cost-sharing information that reflect these subsidies.

II. Data

We use recently released data on plan enrollment in 2014 and 2015 from the Center for Consumer Information and Insurance Oversight (CCIIO), a division of the Centers for Medicare and Medicaid Services (CMS). CCIIO reports total enrollment at the plan-state-year level for each plan offered on Healthcare.gov, the federally-facilitated Marketplace used by 34 states in 2014-2015 (latest years available). We obtained information on premiums, plan generosity, and metal level from the Qualified Health Plan Landscape file for 2014 and 2015. Because plan enrollment is available only at the state-year level but premiums vary at the GRA level, we calculate state-level average premiums for each plan, weighting by the Marketplace-eligible population of counties in which the plan was offered.[2] This approach ignores some premium variation that occurs across GRAs within the plan-state-year. However, there is little such variation: 90% of the variation in 2014-2015 premium changes is explained by plan fixed effects. Table 1 presents summary statistics for the full sample of Marketplace plans and for our analysis sample, which is limited to plans that have positive enrollment in both 2014 and 2015.

[2] We estimate Marketplace eligible population with the IPUMS USA database (Ruggles, Genadek, Goeken, Grover, & Sobek, 2015) using a method developed by Drake et al. (2016).

III. Econometric model

We adopt a discrete choice logit demand framework. We let i index enrollees, j plans, and t markets, which we think of as a state-year. We let J_t be the set of plans available in market t. Plan $j = 0$ indicates the outside option of no coverage or off-exchange coverage.

The conditional indirect utility to enrollee i from plan j in market t is

$$u_{ijt} = -\alpha\left(p_{jt} - PTC_{it}\right) + X_{jt}\beta + \xi_{jt} + \epsilon_{ijt},$$

where α is premium sensitivity, p_{jt} is the gross premium of plan j and PTC_{it} is the tax credit available to person i in market t (which does not vary across plans).[3] Observed product characteristics X_{jt} include dummy variables for deductible levels, state-metal level fixed effects, and, in some specifications insurer-year-metal level fixed effects. The term ξ_{jt} represents unobserved quality. It includes provider network characteristics and unmeasured aspects of cost-sharing, including eligibility for CSR subsidies if j is a silver plan.

The conditional indirect utility from non-insurance purchase is

$$u_{i0t} = u_{i0} - \alpha\tau_{it} + \epsilon_{i0t}$$

where $u_{i0}$is a person-specific value of having any insurance coverage, and τ_{it} is the mandate penalty associated with non-purchase of insurance. This specification allows for arbitrary heterogeneity in the value of having coverage (-u_{i0}).

We renormalize utility by subtracting αPTC_{it} from all options. u_{i0t} and u_{ijt} become

$$u_{i0t} = u_{i0} - \alpha(\tau_{it} + PTC_{it}) + \epsilon_{i0t}$$

$$u_{ijt} = -\alpha p_{jt} + X_{jt}\beta + \xi_{jt} + \epsilon_{ijt} = u_{jt} + \epsilon_{ijt}$$

[3] We set the base price p_{jt} equal to the age 30 price. Prices vary by age, but by a constant factor across plans (so the ratio of prices between plans is the same, regardless of age). Rescaling prices for the age curve would not affect our elasticity estimate, which is already scaled by price. For more details on these tax credits, see CBPP (2017).

Mean utility from choosing plan j ($j \neq 0$), u_{jt}, no longer depends on i. These equations also make clear that the PTC affects insurance demand by reducing the relative utility of non-coverage, rather than shifting the value of one plan relative to another.

We assume that ε_{ijt} is distributed type-1 extreme value. The probability of purchasing plan j is

$$\Pr(j|it) = \frac{\exp(u_{jt})}{1 + \sum_{j' \in J_t} \exp(u_{j't})}.$$

This probability is not i specific, so we can aggregate over enrollees i to obtain observed market shares $s_{jt} = \frac{1}{n}\sum_i \Pr(j|it)$, where s_{jt} is enrollment in plan j as a share of all eligible in market t. Simplifying, we have

$$\log\left(\frac{s_{jt}}{s_{0t}}\right) = u_{jt} = -\alpha p_{jt} + X_{jt}\beta + \xi_{jt}. \quad (1)$$

Our goal is to estimate premium sensitivity α and calculate own premium elasticities. We calculate the premium elasticity two ways: with respect to the gross price, and with respect to the price net of the PTC. The gross price elasticity for plan j in year t is simply $\eta_{jt} = -\alpha p_{jt}(1 - s_{jt})$. This elasticity is relevant for insurers as it determines how their revenue changes when their price changes. The net price elasticity, however, elasticity reflects consumer behavior, and is most comparable to past estimates. The net price elasticity, $\tilde{\eta}$, can be found as $\tilde{\eta}_{jt} = \eta_{jt} r_{jt}$, where r_{jt} is the ratio of the net price to the gross price for plan j in year t.[4]

[4] To calculate this elasticity, we need an estimate of r_{jt}, which requires knowing PTC amounts. For each state, CMS reports average monthly PTC amounts in their Effectuated Enrollment Snapshot. See https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Marketplace-Products/Effectuated_Quarterly_Snapshots.html. We calculate the net price for plan j in year t in a given state as its gross price, minus the average PTC amount in the relevant state and year. For this calculation, we use the gross price at the average age of Marketplace enrollees in the given state and year, calculated from CCIIO enrollment data. Although this approach creates measurement error in the net price, we emphasize we do not use the net price for estimation, only for transforming our price sensitivity estimate into an elasticity. Thus, our use of this approximation does not introduce attenuation bias into our regression estimates.

We do not estimate equation (1) directly because it is likely that premiums and quality ξ_{jt} are highly correlated. To address this correlation, we assume a fixed effects structure: $\xi_{jt} = \xi_j + \tilde{\xi}_{jt}$. We expect that p_{jt} is highly correlated with permanent aspects of quality ξ_j, but not necessarily correlated with the innovation in quality $\tilde{\xi}_{jt}$. This is because many aspects of quality—network, cost sharing, and insurer brand—vary little over time. To deal with the fixed effect, we estimate a differenced version of equation (1):

$$\Delta \log \frac{s_{jt}}{s_{0t}} = -\alpha \Delta p_{jt} + \Delta X_{jt}\beta + \Delta\xi_{jt} \quad (2)$$

We estimate this equation via ordinary least squares, with increasingly stringent controls included in ΔX_{jt}. We always include state fixed effects; in some specifications, we include fixed effects for state-by-metal level, insurer, or insurer-by-metal level, as well as controls for changes in quality. Our identification assumption is that within-plan premium changes from 2014 to 2015 are uncorrelated with plan-specific changes in quality, $\Delta\xi_{it}$. Other changes common to all plans within a state, such as changing Medicaid coverage or healthcare.gov functionality, are captured by the state fixed effect. The most likely threat to our identification assumption is changes in generosity, which we address by controlling for changes in deductible level (measured as in Ericson (2014)), a proxy for more general generosity measures. Our identification strategy is similar to Curto et al. (2015), who use plan fixed effects to control for premium-quality correlation.

IV. Results

Table 2 reports our estimates of premium sensitivity, as well as the elasticity of demand, based on Equation (2). We begin in column (1) with state fixed effects, and add richer fixed effects and controls in subsequent columns. Our preferred estimate, in column (3), controls for state-metal level fixed effects and changes in plan deductible. The elasticity with respect to the gross premium is 4.59 (P<0.001). As the subsidies cover, on average, about 60% of the premium, the elasticity with respect to the net premium is about 60% smaller, 1.70. In the remaining columns, we control for insurer-state and insurer-state-metal level fixed effects, which adjust for insurer-specific changes in networks and advertising. These extra controls do not reduce premium sensitivity, but they reduce precision. Thus, our preferred specification includes state-metal level fixed effects and deductible controls.

Although our elasticity estimate relies on a parametric model of demand and a within-plan identification strategy, several factors suggest that the estimate is not driven by these assumptions. First, Figure 1 shows the basic variation underlying our results. It is clear that premium changes and enrollment changes are highly negatively correlated; this finding is independent of any functional form for demand. Furthermore, in Table 3 we show that our results are robust to non-logit specifications, in which we simply regress changes in log enrollment or changes in log market shares on changes in log premiums and controls.

It is also unlikely that our identification approach—from within-plan premium changes—drives our high premium elasticity estimates. Plausible failures of our identification assumption imply that our premium elasticity is too small, not too large. For example, it is possible that unobserved aspects of generosity change with premiums. However, this would result in a bias towards zero, as we expect a *positive* correlation between generosity changes and premium changes.

V. Discussion

Our estimated elasticity of demand with respect to the premium net of subsidies, 1.70, is particularly large relative to estimated net price elasticities for employer-sponsored plans, which range from 0.2 to 0.8. (Abraham, Vogt, & Gaynor, 2006; Bundorf, Levin, & Mahoney, 2012;

Curto, Einav, Levin, & Bhattacharya, 2015; Cutler & Reber, 1998; Einav, Finkelstein, & Cullen, 2010; Royalty & Solomon, 1999); it is also larger than the elasticity of 1.15 that Curto et al. have estimated for Medicare Advantage plans (Curto et al. 2015). Two unusual features of the Marketplaces likely generate this high elasticity. First, Marketplaces have an unusually large number of active choosers, both because of rapid market growth from 2014 to 2015, and because of high "churn" from people entering and exiting the Marketplaces, due to job transitions, new discovery of the market, or changing Medicaid eligibility. Active choice is important because past literature has documented substantial inertia in insurance plan choice, leading to low premium elasticities (Ericson, 2014; Handel, 2013). Indeed, when Royalty & Solomon (1999) estimate elasticities among switchers—who make active choices, in a context with standardized plans—they find high elasticities, comparable to ours.

Second, Marketplaces contain standardized plans, including many close substitutes. For example, the median county in 2015 had 41 Marketplace plans, including 15 silver plans.[5] Premium elasticities are likely to be larger when many close substitutes are available. The design of the Marketplaces themselves, with their standardized presentation of premiums and benefits, may also raise elasticities (Schmitz & Ziebarth, 2017).[6] The Medicare Part D market also involves standardized presentations, and past research has found large elasticities (between 5 and 6, larger even than those found here) for these plans which are also sold through a centralized portal (Decarolis, Polyakova, & Ryan, 2015; Lucarelli, Prince, & Simon, 2012).

These results are relevant also for understanding Marketplace performance under possible ACA replacement plans. Both the American Health Care Act the Better Care Reconciliation Act

[5] See https://meps.ahrq.gov/data_stats/summ_tables/insr/national/series_1/2015/tia2d.pdf

[6] Note, however, that Ericson and Starc (2016) find that standardizations of benefits (but not display information) on the Massachusetts Health Insurance Exchange did not increase price sensitivity.

(the House and Senate replacement plans) preserve the Marketplaces as centralized markets for purchasing insurance. The high elasticity we document suggests that, on the one hand, competition can be an effective tool for reducing premiums but, on the other hand, insurers may find it difficult to turn a profit, and limited entry may be a concern in the absence of subsidies.

These results raise several questions for future research. First, it would be valuable to know which of the many unusual features of the Marketplaces—growth, churn, product standardization, and display standardization—drive high premium elasticities. Second, how desirable is standardization, particularly if it leads to high sensitivity to the transparent features of the plan? The current display highlights premiums and cost-sharing information. When information on some dimensions are made easier to find, consumers may feel less incentive to find information on other features, for example because there is a fixed cost of acquiring any amount of product information. Although display standardization of premiums may reduce the likelihood that customers choose overly expensive or even dominated plans (as in Bhargava et al. (2015)), it also may encourage consumers to focus too much on premiums and cost sharing, and ignore other relevant but non-salient product characteristics like network composition or prescription drug formularies.

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Tables and figures

Table 1: Summary statistics

	All plans sample				Analysis sample			
	2014		2015		2014		2015	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Enrollment (1000s)	2.07	(8.60)	2.33	(8.81)	2.24	(6.92)	2.91	(9.81)
Age 30 Premium ($1000)	3.35	(1.81)	3.18	(0.87)	3.1	(0.80)	3.23	(0.82)
Deductible ($1000s)	3.19	(2.09)	3.35	(2.08)	3.14	(2.06)	3.19	(2.11)
Catastrophic	0.09	(0.28)	0.06	(0.24)	0.09	(0.28)	0.09	(0.28)
Bronze	0.28	(0.45)	0.28	(0.45)	0.25	(0.43)	0.25	(0.43)
Silver	0.32	(0.47)	0.36	(0.48)	0.36	(0.48)	0.36	(0.48)
Gold	0.26	(0.44)	0.24	(0.43)	0.26	(0.44)	0.26	(0.44)
Platinum	0.06	(0.23)	0.05	(0.22)	0.05	(0.22)	0.05	(0.22)
Exit	0.49	(0.50)	--	--	--	--	--	--
Enter	--	--	0.63	(0.48)	--	--	--	--
Number of Plans	2710	2710	3799	3799	1353	1353	1353	1353
Number of Insurers	181	181	213	213	142	142	142	142

Notes: Mean and standard deviation in parentheses. The all plans sample consists of all plans offered in healthcare.gov in either 2014 or 2015, except those with a non-unique linkage between years. The analysis sample is further limited to plans with positive enrollment in both years. Catastrophic, bronze, silver, gold, and platinum are dummy variables indicating plan type; exit and are dummy variables indicating exit in 2014 or entry in 2015.

Table 2: Demand for marketplace plans is highly elastic

	(1)	(2)	(3)	(4)	(5)
Price sensitivity	-1.61	-1.60	-1.46	-1.82	-1.79
	(0.19)	(0.20)	(0.22)	(0.33)	(0.80)
Gross price elasticity	-5.05	-5.03	-4.59	-5.71	-5.61
	(0.62)	(0.66)	(0.70)	(1.06)	(2.56)
Net price elasticity	-1.87	-1.87	-1.70	-2.12	-2.08
	(0.26)	(0.29)	(0.30)	(0.44)	(1.03)
Deductible controls?	No	No	Yes	Yes	Yes
State FE	X				
State-metal FE		X	X		
State-insurer FE				X	
State-insurer-metal FE					X
R-squared	0.38	0.48	0.53	0.60	0.76
Number of plans	1,353	1,353	1,353	1,353	1,353
Number of Insurers	142	142	142	142	142

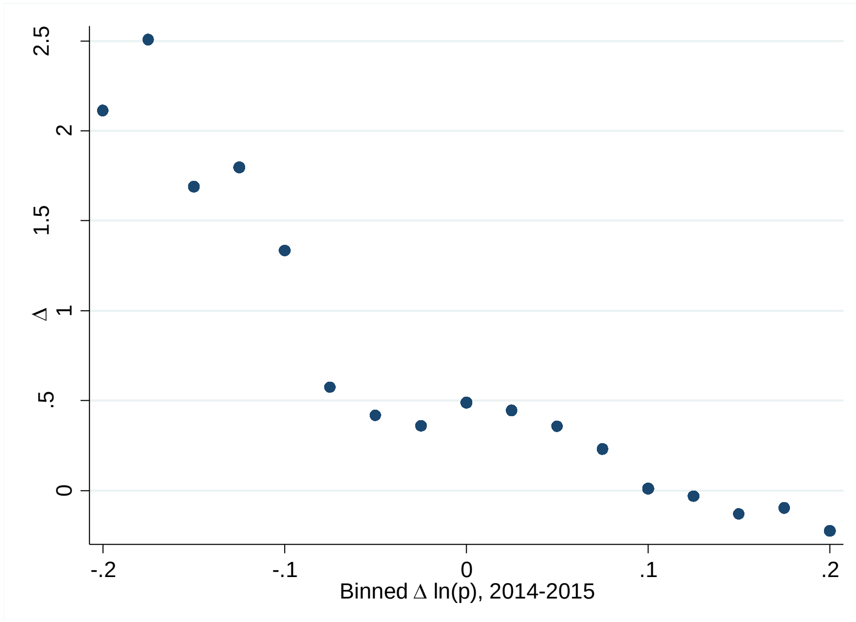
Notes: Sample consists of all plans offered on health care with positive enrollment in 2014 and 2015 and a unique linkage between years. Table shows coefficients on the change in log price from a regression of change in log enrollment on change in log price as well as the indicated controls and fixed effects. Robust standard errors, estimated by the bootstrap (resampling insurers), in parentheses.

Table 3: Robustness of elasticities to alternative specification choices

Specification	Baseline (1)	Log enrollment (2)	Log share (3)	Log inside share (4)
Gross price elasticity	-4.59	-5.20	-4.67	-4.67
	(0.67)	(0.69)	(0.78)	(0.86)
Net price elasticity	-1.70	-1.76	-1.58	-1.58
	(0.30)	(0.28)	(0.30)	(0.33)

Notes: Sample consists of all plans offered on health care with positive enrollment in 2014 and 2015 and a unique linkage between years. Table shows the estimated own-price elasticity of demand from various specifications. All specifications include controls for deductible level and state-metal level fixed effects. Column (1) is the baseline specification corresponding to column (3) of table 1. In columns (2)-(4) we regress the change in log size on the change in log price, as well as the controls; we interpret the price coefficient as the elasticity. We consider alternative measures of size. In column (2), we treat size as enrollment; in column (3) we treat size as market share (enrollment divided by total eligibility); in column (4) we treat size as the inside share (plan enrollment divided by total enrollment). Robust standard errors, estimated by the bootstrap (resampling insurers), in parentheses.

Figure 1: Price and enrollment changes were highly correlated among Marketplace plans in 2014-2015



Notes: Sample consists of all plans offered on health care with positive enrollment in 2014 and 2015 and a unique linkage between years. The figure shows, for each 0.025 bin of the change in log price from 2014-2015, the average change in log enrollment between 2014 and 2015. We plot the middle 95% of the distribution of $\Delta \ln p$.