More Insurers Lower Premiums: Evidence from Initial Pricing in the Health Insurance Marketplaces

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Abstract

First-year insurer participation in the Health Insurance Marketplaces (HIMs) established by the Affordable Care Act is limited in many areas of the country. There are 3.9 participants, on (population-weighted) average, in the 395 ratings areas spanning the 34 states with federally facilitated marketplaces (FFMs). Using data on the plans offered in the FFMs, together with predicted market shares for HIM participants (estimated using 2011 insurer-state market shares in the individual insurance market), we study the impact of competition on premiums. We exploit variation in ratings-area-level competition induced by UnitedHealthcare's decision not to participate in any of the FFMs. We estimate that the second-lowest-price silver premium (which is directly linked to federal subsidies) would have decreased by 5.4 percent, on average, had UnitedHealthcare participated. If all insurers active in each state's individual insurance market in 2011 had participated in all ratings areas in that state's HIM, we estimate this key premium would be 11.1% lower and 2014 federal subsidies would be reduced by $1.7 billion.

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1. Introduction

The Patient Protection and Affordable Care Act (ACA), passed in March 2010 and upheld by the U.S. Supreme Court in June 2012, introduced dramatic reforms to the health insurance industry. A number of benefit designs were banned, premium variation was limited, and online marketplaces for the purchase of insurance were established in every state. Along with Medicaid expansions and mandates for individuals to purchase and large employers to offer coverage, these marketplaces are a key vehicle for expanding insurance coverage. Federal health insurance subsidies are only available to those who purchase a policy through Health Insurance Marketplaces (HIMs), formerly known as exchanges. HIMs are intended to promote competition along "beneficial" dimensions (such as premiums and quality), while at the same time limiting competition along dimensions thought to be socially undesirable (such as selection based on the health of enrollees). Whether the federal health reform affordably expands insurance coverage will depend in no small part on the success of HIMs.

The success of HIMs, in turn, will depend on attracting both consumers and insurers. Competition can only have its salutary effects if there are competitors. Prior to the ACA, health insurance markets were very concentrated. The average state HHI for the individual insurance market was 4,100 in 2011, substantially higher than the Department of Justice's threshold of 2,500 for "highly concentrated."[1] HIMs were designed to lower barriers to entry into the insurance industry. By steering a pool of subsidy-eligible consumers to HIMs and mandating that individuals carry insurance, policymakers hoped to create enough new demand to allow entrants to achieve reasonable scale. HIMs also fulfill the role of "certifying" new entrants, whose plans must satisfy federal standards in order to participate in these regulated marketplaces. This federal stamp of approval serves to increase both consumer and supplier confidence in the quality of entrants, a feat that has proved challenging in recent history. And by displaying products online on a centralized website, HIMs reduce marketing, sales, and administrative costs. In addition, the ACA provided subsidized loans to new, nonprofit insurance co-operatives known as Consumer Operated and Oriented Plans, or CO-OPs.

[1] Calculated using data from the Center for Consumer Information and Insurance Oversight (CCIIO), described in Section 3.

In spite of these policies, there was limited participation in HIMs during 2014, their first year of operation (and the only year for which data are presently available). In the discussion that follows, we focus exclusively on the 34 federally-facilitated marketplaces (FFMs), as our identification strategy and data pertains only to this set of marketplaces. Of the 102 top-three insurers in the 34 federally-facilitated marketplaces (FFMs), 55 participated in the relevant state HIM. A number of large national insurers, such as Aetna, Cigna, and Humana, participated in only a limited number of HIMs.[2] As we discuss in detail below, the nation's largest insurer, UnitedHealthcare (hereafter United), did not participate in *any* of the FFMs. There were some new entrants, however. Across all FFMs, there were 36 new insurer-state "entries," where entry is defined as participation by an insurer that did not offer individual insurance in that state in 2011.[3] Of these 36, 13 were CO-OPs.[4]

The combination of concentrated pre-HIM markets, substantial nonparticipation in the HIMs, and limited entry imply highly concentrated marketplaces. **Figure 1** gives the population-weighted distribution of insurers across the 395 federally delineated ratings areas in the 34 FFM states. Ratings areas are state-defined regions across which insurers may vary price and participation.[5] Seven percent of the population lives in areas with only one insurance option, and about half live in areas with three or fewer options. On a population-weighted basis, there are on average 3.9 insurers per market, with 2.9 incumbents (i.e., insurers who are not new to the individual market), 0.3 CO-OP entrants and 0.7 non-CO-OP entrants.

In this study, we explore the effect of insurer participation in HIMs on 2014 premiums. Prior empirical research finds that insurer consolidation has led to higher premiums for large employer-sponsored plans (Dafny, Duggan, and Ramanarayanan 2012) and fully-insured, small group plans (Guardado et al. 2013). The degree and nature of competition, and hence the

[2] Our numbers may not match those reported by the Department of Health and Human Services (or other sources) as we attempted to identify plans offered by the same insurer under different names and link them to a single insurer.
[3] Based on 2011 data, 33 of these 36 had not previously offered individual insurance in any FFM state. Most "entrants" to the individual market are insurers who previously provided Medicaid-managed care in a given state.
[4] There are 13 new, federally sponsored CO-OPs operating in 13 of the 34 FFMs. In 2014, each CO-OP operated in only one state, with three exceptions. First, "CO-OPortunity Health" operates in both Iowa and Nebraska. Second, "Health CO-OPerative SCW" *and* "Common Ground Healthcare CO-OPerative" operate in Wisconsin.
[5] According to the Department of Health and Human Services, ratings areas "overlap with the issuer service areas in many, but not all, cases. In general, the number of issuers or plans available in a rating area will be the number of choices available to all individuals and families living in that rating area. Issuers are not required to offer a qualified health plan in every rating area within a state, however, so the number of available issuers and qualified health plans varies by rating area." (Source: ASPE Issue Brief, Health insurance Marketplace Premiums for 2014, available at http://aspe.hhs.gov/health/reports/2013/marketplacepremiums/ib_marketplace_premiums.cfm). Thus, ratings areas are natural market definitions for insurance offered through exchanges.

quantitative relationship between market structure and premiums, may be different in the HIMs.[6] On one hand, HIMs standardize some plan features and facilitate plan comparisons, creating a more Bertrand-like pricing environment. If these design features enable this competitive ideal, markups can be low in markets with as few as two insurers. On the other hand, the transparent display of nonstandardized plan features (e.g., provider networks) and (eventually) plan quality may spur product differentiation, higher markups, and potentially higher average premiums. In addition, the existence of subsidies may dampen the price elasticity of some buyers, tempering the relationship between competition and price (and implying more competitors are needed, *ceteris paribus*, to generate competitive outcomes).

Our empirical work focuses on the premium for the second-lowest-priced silver plan within a market. We refer to this premium as *2LPS*. Federal subsidies are linked to the *2LPS*, and past evidence suggests that the lower tail of the premium distribution may be particularly important to consumers (Ericson and Starc 2012a). The *2LPS* exhibits a substantial amount of variation nationally: among FFMs, the 90th percentile of *2LPS* is 45% higher than the 10th percentile.

Existing cross-sectional analyses suggest that HIMs with more insurers have lower premiums.[7] **Figure 2** illustrates that HIMs with more participants generally have lower *2LPS*. The graph shows the distribution of *2LPS* by the number of HIM participants, along with a fitted line from a univariate regression; while there is substantial variation around the line, the slope is negative (correlation coefficient = -0.35).

This fact admits many interpretations. For example, insurers may prefer to participate in geographic markets where medical costs are lower. To mitigate such endogeneity concerns, we exploit United's decision to uniformly avoid all 34 FFMs as a source of quasi-experimental variation in ex-post marketplace concentration. United's nonparticipation differentially affected the competitive environment across markets, owing to its pre-ACA premium and product characteristics as well as the participation decisions, premiums, and product characteristics of rivals. It is also a policy-relevant source of variation, as insurers similar to United are likely marginal nonparticipants: if expected profits for insurers increase, large insurers who shunned the HIMS are likely to enter.

[6] There are a number of additional reasons why extrapolating from Dafny, Duggan, and Ramanarayanan (2012) to our scenario is difficult. For example, they study the large-group market, and the initial level of concentration in these markets during their study period is significantly lower.

[7] See, for example, http://aspe.hhs.gov/health/reports/2013/MarketplacePremiums/ib_marketplace_premiums.cfm.

We construct a measure of the change in market concentration resulting from United's decision to avoid FFMs. We then model *2LPS* across rating areas as a function of this measure. We find that premiums are highest in markets where United's participation would have most reduced concentration. Our findings are robust to a wide variety of specification checks.

We estimate that the population-weighted average *2LPS* would have been 5.4% lower had United entered all markets in the FFMs. If all insurers present in a state's individual market in 2011 had entered the FFMs, we estimate that the weighted average *2LPS* in the FFMs would have been 11.1% lower. We also find that *2LPS* is lower in markets with CO-OPs, although we caution against a causal interpretation of this association due to the potential endogeneity of CO-OP locations.

These results suggest that additional competitors can have a large impact on premiums and federal subsidies for HIM plans. Spiro and Gruber (2013) estimate that each 1% reduction in *2LPS* reduces federal subsidies by 1.25%. Back-of-the-envelope calculations imply that attracting all incumbents to insurance markets would save an estimated $1.7 billion in federal subsidies in 2014, and $105.2 billion over the 2014-2023 ten-year horizon, under the (admittedly strong) assumptions that our findings are generalizable to state-based HIMs and that market structures do not change.

The remainder of the paper proceeds as follows. Section 2 provides background on the health insurance marketplaces, United's nonparticipation decision, and prior research on competition among health insurers. Section 3 describes the construction of our dataset and discusses summary statistics. Section 4 presents the main analysis. Section 5 provides a falsification check of the results by examining the relationship between pre-HIM individual market premiums and the instrument for HIM HHI. We also discuss robustness of the findings to alternative specifications. Section 6 concludes.

2. Background

2.1 Health Insurance Marketplaces

HIMs are regulated online marketplaces for the purchase of health insurance. In this paper, we study HIMs for individual policies.[8] The ACA gave states three options with respect to the development of their HIMs: (1) design and manage their own (so-called "state-based" marketplaces)—selected by 16 states and DC; (2) let the federal government design and operate the marketplace—selected by 27 states; (3) pursue a hybrid approach ("state–federal partnership" marketplace)—selected by 7 states. Options (2) and (3) together comprise the federally-facilitated marketplaces (FFMs). All HIMs became available as of October 1st, 2013 for individuals to purchase coverage effective in January 2014.

The broad design of an HIM is the same in every state. Five tiers of products are offered. The first tier consists of "catastrophic" high-deductible plans offered primarily to those under age 30.[9] The four remaining tiers are categorized by "actuarial value" (AV), defined as the share of healthcare spending that an insurance plan pays for a typical enrollee. These tiers are identified by precious metals (AV thresholds): bronze (0.6); silver (0.7); gold (0.8); and platinum (0.9). The ACA requires all products sold on or off the HIMs in the individual and small-group markets to conform to one of these tiers. In addition, all plans in these markets must satisfy federal standards regarding "essential health benefits." Essential health benefits include coverage of a specified set of services, restrictions on benefits limitations (such as annual spending limits), and a maximum out-of-pocket exposure for enrollees of $6,350 (single)/$12,700 (family).

Subject to this standardization, insurers have wide latitude to design their products in almost all states. For example, insurers may adjust features of patient out-of-pocket costs in any way that satisfies the AV standard for a plan's metal tier. Insurers can offer any plan design that is within 2% of the actuarial-value target, as long as essential benefits are covered. Insurers may also compete on network design, subject to broad restrictions on network adequacy. The resulting variation across plans is meaningful. On the pre-ACA Massachusetts exchange, which

[8] HIMs for small-group policies exist—and are known by the acronym SHOP for the Small Health Options Program—but as of this writing they do not yet comply with many requirements included in the ACA. Premium and other data on SHOP plans are not readily available.

[9] The catastrophic plan is also available to individuals who do not have the option to purchase insurance below the mandate affordability threshold of 8% of income.

standardized benefits to a greater degree than required by the ACA, the most expensive plan within a standardized benefits tier (and for a specific zipcode–age combination) was 50% more expensive than the cheapest plan (Ericson and Starc 2013b).

Plans on the HIMs set their own premiums. While there is no explicit premium regulation, there is regulation on the plan Medical Loss Ratio (MLR), the ratio of medical benefits paid out to premiums collected. MLRs must exceed 80% in the individual market and 85% in the small-group market, which places limits on the ability of firms to make large profits. In addition, premiums are community-rated, varying only by ratings area, family composition, tobacco use, and age, with a maximum 3:1 ratio of the premiums for the oldest:youngest enrollee.

All plans on an HIM must successfully complete the HIM's "plan certification process." The process is uniform across FFMs and is described through public announcements by the Centers for Medicare and Medicaid Services.[10] Each plan must be certified as "qualified health plan" (QHP) in the relevant state. QHPs must satisfy a set of standards regarding licensure, service areas, network adequacy, and patient safety. They must also undergo a review of rates. States may review QHP applications and provide recommendations to CMS regarding certification.

Individuals in the HIMs will in most cases be purchasing insurance products using a federal tax subsidy. The ACA provides that households with income between 100% and 400% of the federal poverty line may access tax credits to offset some of their premiums. These tax credits offset the difference between premiums and a sliding-scale percentage of income, beginning at 2% of income for households with income equal to 100% of the poverty line and rising to 9.5% of income between 300–400% of the poverty line. In some states, a federally funded Medicaid expansion covers all those below 133% of the poverty line, so HIM participation starts at that higher level; in states without Medicaid expansions, eligibility for HIM subsidies begins at 100% of the poverty line. An estimated 4.8 million individuals have income below the federal poverty line and are ineligible for subsidies and Medicaid.[11]

[10] For 2015, this notice is available at http://www.cms.gov/CCIIO/Resources/Regulations-and-Guidance/Downloads/2015-final-issuer-letter-3-14-2014.pdf.

[11] Source: "The Coverage Gap: Uninsured Poor Adults in States that Do Not Expand Medicaid ," *Kaiser Family Foundation Issue Brief*, March 2014. http://kaiserfamilyfoundation.files.wordpress.com/2014/04/8505-the-coverage-gap_uninsured-poor-adults-in-states-that-do-not-expand-medicaid.pdf

2.2 United's Nonparticipation

A standard difficulty with any study assessing the impact of market concentration on price is the endogeneity of market participation and market shares. In this setting, one concern with regressing HIM premiums on market concentration arises from the possibility that participation decisions (whether by incumbents or *de novo* entrants) may have been affected by expectations about market premiums. Many of the large national insurers, such as Aetna, Humana, and Cigna selectively entered the HIMs. For example, Aetna entered 16 of 34 FFMs.[12]

One exception is United, the nation's largest commercial insurer. Once a midsize regional insurer, United now has a national footprint, achieved largely through acquisitions.[13] Its market share varies widely across states, with no consistent geographic pattern. In the individual insurance market, these shares range from < 1% in Montana, North and South Dakota, New Hampshire, Maine, and Utah to over 20% in South Carolina, Missouri, West Virginia, and Arizona.

The variation in United's pre-HIM market position implies that its blanket nonparticipation decision (discussed below) differentially affected the competitive landscape of each market. United's decision not to enter could affect *2LPS* through two mechanisms (1) a "direct effect" arising from the possibility that United could have offered one of the two lowest-priced silver plans in a given market; and/or (2) an "indirect effect" due to rivals' strategically lowering their premiums to compete with United. We expect both effects to be larger in areas where United would have been a more significant competitor on the HIMs. In areas where United had higher pre-HIM market share in the individual insurance market, we can infer that its combination of premium and product attributes was relatively attractive. Thus, its decision to stay out of the market ought to have softened competition more considerably in these markets (the indirect effect). If United's premium tended to be on the low side in these markets as well, all else equal we would also expect the direct effect to be larger in these areas. Our data on pre-HIM

[12] These entry decisions are nonrandom. For example, Aetna's pre-exchange individual market share (per 2011 CCIO data, described below) was more than twice as high in the markets it entered as compared to those it did not. Note that Aetna participates on seven exchanges using the Aetna brand name. In most other exchanges, it offers plans under the brand name of Coventry, which it acquired in 2013.

[13] Major plan acquisitions in the past decade include Oxford and Mid Atlantic Medical Services (MAMSI) in 2004, PacifiCare in 2005, Sierra in 2008, and parts of HealthNet in 2009.

individual market premiums (described in Section 3 below) confirm that United's relative rates are lower in states in which they have a larger presence.[14]

Note that if United's decision not to participate in a market provoked others who would not otherwise have participated to do so—and if this is particularly likely where United had high pre-HIM share because the market opportunity is more substantial—then our estimated effects will be downward-biased. Given the long application process associated with participating in the first-generation FFMs, we believe this bias is likely to be small. For the same reason, the indirect effect may also be low in the first year of the HIM operations, as rivals may not have had ample time to adjust their premiums in light of United's nonparticipation decision.

Figure 3 depicts a timeline for insurers' applications and submissions to HIMs, along with pertinent public statements United made about their participation plans. Per the Centers for Medicare and Medicaid Services (CMS), insurers had to submit their plan designs by the end of March 2013 and premiums by May 3rd.[15] However, there was likely some flexibility to adjust premiums after that deadline, as in late June Kathleen Sebelius, secretary of the Department of Health and Human Services (which oversees CMS), stated that rates were not yet finalized.[16]

The first public proclamation of limited participation by United appeared in January 2013, when the Wall Street Journal reported that United was "expected to participate in 10 to 25 … marketplaces … out of … 100."[17] As this total incorporates the small-business HIMs (SHOPs), the implication is that United was expected to participate in 5–13 individual HIMs (out of the 51 HIMs, one in each state as well as Washington, DC). The article further quotes United's CEO as stating, "[United's] level of interest in exchanges will be driven by how we assess each local market—how the exchange and rules are set up state by state." This statement foreshadows United's blanket decision to stay out of all the FFMs, which had uniform regulations. It is therefore possible that some insurers accurately predicted United's nonparticipation in at least some states at this time.

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[14] Specifically, United's relative price position (as measured by where its premium per member falls in the within-state premium distribution) was lower in states where it had greater pre-exchange share.

[15] http://www.cms.gov/CCIIO/Resources/Fact-Sheets-and-FAQs/Downloads/marketplace-timeline-narrative.pdf.

[16] Sebelius asserted, "We will be negotiating rates across the country." While HHS lacks the authority to "actively negotiate" with plans (i.e., exclude plans if their rates are too high), HHS may have had other levers to negotiate with insurers, and insurers would likely have been free to revise premiums downward at this point. http://capsules.kaiserhealthnews.org/index.php/2013/06/sebelius-administration-is-negotiating-rates-in-federal-exchanges/.

[17] http://online.wsj.com/news/articles/SB10001424127887324468104578247332079234240.

On April 18th, 2013, a couple of weeks before HHS's May 3rd Initial Qualified Health Plan Submission Deadline, United's CEO reiterated: "We will be very selective. … [We] do not believe exchanges will be a significant factor … in our 2014 commercial market outlook." Given this statement occurred after the "participation deadline" of March 31 and before premiums were finalized, this later announcement could have influenced pricing (the indirect effect). Note, however, that even if rivals did not attempt to predict and incorporate United's decisions into their pricing decisions, the direct effect would still operate as a mechanism to lower premiums.

2.3 Prior Research

2.3.1 Insurance Market Competition

This study builds on existing research on competition among private insurers. A number of recent studies show that imperfect competition in various U.S. health insurance markets leads to higher premiums. These include Starc (forthcoming) for the Medigap market, Starc and Ericson (2012b) for the Massachusetts health insurance exchange, Dafny et al. (2012) for the large employer market, and Guardado et al. (2013) for the fully-insured, small employer market. Starc predicts that entry of a single additional large insurer would reduce the enrollment-weighted Medigap premium by 21 percent and expand the market by 50 percent. Starc and Ericson build a model of consumer demand using enrollment data from the Massachusetts health insurance exchange and simulate optimal insurer pricing under alternative competitive scenarios. They find that pricing exceeds the levels predicted under perfect competition. Dafny et al. (2012) quantify the impact of market concentration (as measured by HHI) on premium growth in the large group segment, instrumenting for concentration using the predicted change in local market HHI generated by a large, national merger in 1999. This merger had varying impacts on local markets owing to differences in the market shares and geographic overlap of the merging firms. They estimate premiums in the average market were approximately seven percentage points higher by 2007 due to increases in local concentration between 1998 and 2006. Finally, Guardado et al. (2013) use data on small-group premiums at the MSA-carrier level to study the impact of a 2008 merger between Nevada's 1st and 3rd-largest insurance carriers, United and Sierra Health Services. As compared to plans in control MSAs (matched to the treatment MSAs

using propensity scores), metropolitan areas affected by the merger experienced premium increases of 13.7 percent.

Our instrument is similar in spirit to that used by Dafny et al. We exploit variation in the local impact of United's national nonparticipation decision to identify the effect of exchange market concentration on premiums. Whereas Dafny et al. study the effect of HHI on premium growth, we have only one year of data and hence focus on premium levels. Our point estimates are roughly one-third the size of those reported by Dafny et al. Because their estimate captures the cumulative impact of changes in HHI over time, it is unsurprising that we find a smaller single-year effect.

2.3.2 Exchange Research

As HIMs are a recent phenomenon, there is a limited amount of relevant prior research. We briefly discuss the literatures on the three most direct predecessors to HIMs: the Massachussetts Connector exchange, Medicare Advantage and Medicare Part D.

There are a number of recent papers examining the Massachusetts Health Connector, an exchange established by the 2006 healthcare reforms in Massachusetts. In a series of papers, Ericson and Starc study: (1) how changes in the degree of plan standardization required by the exchange affected consumer choice, plans offered, and pricing (Ericson and Starc 2013b), (2) what types of plans consumers choose (20% select the cheapest option; Ericson and Starc 2012a), and (3) the interaction between age-specific consumer price elasticities, imperfect competition, and modified community rating (Ericson and Starc 2012b). Hackmann, Kolstad, and Kowalski (2013) report that average costs and premiums per insured individual in Massachusetts decreased following the imposition of the mandate to carry insurance coverage, confirming adverse selection into the state's individual insurance market prior to 2006.

Another predecessor of HIMs is the market for privately-provided Medicare plans, known today as "Medicare Advantage". Like HIMs, competition among plans can affect prices and subsidies. Unlike HIMs, market participants compete against traditional Medicare, and often use the same provider reimbursement rates as traditional Medicare. Medicare Advantage premiums (after subsidies, which all Medicare eligible enjoy) cannot fall below zero. In addition, profit margins are restricted. Thus, plans may provide beneficiaries with additional benefits beyond those offered in traditional Medicare. Of greatest relevance to our work, a growing body of

evidence suggests that Medicare Advantage markets are imperfectly competitive, with a large share of increases in government subsidies accruing to providers, rather than being competed away through more generous enrollee benefits (See, for example, Song, Landrum and Chernew 2012; Song, Landrum and Chernew 2013; Cabral, Geruso and Mahoney 2013; and Duggan, Starc and Vabson 2014).

There is a substantial and growing body of literature on Medicare Part D, a marketplace with many similarities to the HIMs. In both settings, the government subsidizes purchases and creates rules to manage how competition among firms takes place. This literature focuses heavily on whether enrollees make good choices, how limitations in consumer decision-making affect firm behavior, and how alternative choice architecture could improve consumer welfare. (See, for example, Abaluck and Gruber 2011, 2013; Ericson *forthcoming*; Ketcham et al. 2012; Kling et al. 2012; Lucarelli, Prince, and Simon 2012; Zhou and Zhang 2012; and Heiss et al. 2012). Overall, the Medicare Part D literature suggests that even with robust entry, poor optimization by enrollees mitigates the salutary effects of competition.

3. Data and Methodology

We draw on a number of sources to create a dataset of plans offered in the 395 ratings areas (across 34 FFMs), along with measures of ratings-area-level market structure and local health spending. Because United's nonparticipation decision was uniform only across FFMs, we limit attention to these. We also construct a dataset of enrollment and premiums at various units of geography, depending on the source.

3.1 Key Dependent and Independent Variables

Data on plans were downloaded from the healthcare.gov website.[18] The plan data contains insurer identifiers, plan metal tier, ratings areas in which a plan is offered, and premiums for a 27-year-old. Our key dependent variable, *2LPS*, is the premium for the second-lowest-price silver plan in a ratings area. Plan premiums for other ages and family structures are a constant percentage of the 27-year-old single premium.[19]

[18] Source: https://www.healthcare.gov/health-plan-information/.
[19] States had the opportunity to design their own state-specific age curves for defining how premiums would vary by age. None in our sample did so.

We focus on the *2LPS* for two reasons. First, federal subsidies are linked to the *2LPS* in each "ratings area," the geographic market utilized on the HIMs. More specifically, subsidies are set so that *2LPS* minus the subsidy is no more than x% of income, where x ranges between 2 and 9.5 and increases with income as described in section 2. Those with household incomes above 400% of the federal poverty line are not eligible for subsidies. Recently-released enrollment data from the FFMs shows that 85 percent of enrollees in 2014 received government subsidies.[20] The Congressional Budget Office projects that 76 percent of HIM enrollees in 2020 will receive subsidies, accounting for $93 billion of the $197 billion estimated cost of ACA's coverage expansions.[21] Thus, *2LPS* is a key driver of the overall costs of the ACA.

Second, there is evidence that the lower segment of the premium distribution is particularly important to consumers. As noted above, Ericson and Starc (2012a) report that a substantial number of consumers who purchased insurance on the Massachusetts exchange in 2007–2009 selected the least expensive plan. In 2014, 65 percent of FFM enrollees chose a silver plan, and 20 percent chose bronze plans.[22] More pragmatically, given the number of plans, and our inability to judge which of these will prove relevant in each marketplace, a measure like the mean or median is less informative. For completeness, however, we also report results using such measures.

Our key independent variable for measuring competition is HHI, a predicted Herfindahl–Hirschman Index. Because the market is new, we must predict market shares in order to compute a predicted HHI. To do so, we match insurers appearing in the FFM data with state-insurer enrollment data (in the individual insurance market) for 2011. These data are collected and reported by the Center for Consumer Information and Insurance Oversight (CCIIO) for the purpose of enforcing the Minimum Loss Ratio (MLR) regulations.

For insurer i in ratings area m, we define $share_{im}$ as its share among those insurers who are active within that ratings area in the exchange, under the assumption that insurers split the market proportionally to their ex ante (i.e., 2011) state shares. Based on the limited empirical evidence available, it appears that pre-exchange shares are highly correlated with exchange

[20] http://aspe.hhs.gov/health/reports/2014/MarketPlaceEnrollment/Apr2014/excel/workbook.xls
[21] http://www.cbo.gov/sites/default/files/cbofiles/attachments/45231-ACA_Estimates.pdf
[22] *Ibid.* 15 percent chose catastrophic, gold or platinum plans.

shares.[23] This methodology gives new entrants a share of zero. (In Section 5.2, we discuss the robustness of our results to alternative share allocations for entrants.) Denoting the set of insurers in market m as I_m, we construct $HHI_m = \sum_{i \in I_m} share_{im}$.

Next, we construct ΔHHI, the change in HHI resulting from United's nonparticipation. The predicted share of each insurer had United entered the market is denoted $share_{im}^U$, and the predicted HHI is HHI_m^U. United's share had it entered the FFMs is $share_{UHCm}^U$. Note that for all insurers other than United, $share_{im} = \frac{share_{im}^U}{1 - share_{UHCm}^U}$. The increase in HHI from United's nonparticipation can then be expressed as:

$$\Delta HHI_m = HHI_m - HHI_m^U \tag{1}$$

$$\Delta HHI_m = \sum_{i \in I_m} \left(\frac{share_{im}^U}{1 - share_{UHCm}^U} \right)^2 - \left(\sum_{i \in I_m} \left(share_{im}^U \right)^2 + \left(share_{UHCm}^U \right)^2 \right) \tag{2}$$

The effect of increasing United's share on ΔHHI_m is:

$$\frac{\partial \Delta HHI_m}{\partial share_{UHCm}^U} = 2[HHI_m - share_{UHCm}^U HHI_m - share_{UHCm}^U] \tag{3}$$

This expression shows that, theoretically, United's nonparticipation has a nonmonotonic effect on ΔHHI. If United is very large and its competitors are all small, ΔHHI will decrease in $share_{UHCm}^U$ and can even become negative. As a practical matter, ΔHHI in our data is almost always increasing in United's share, and is only negative for one observation. We censor this observation at zero in our main results; dropping it has little impact on the findings.

An alternative to ΔHHI is United's pre-exchange share. The advantage of using HHI is that it captures the relative importance of United's rivals: a 10% United share matters more in a

[23] Emerging evidence on exchange enrollment suggests that pre-exchange shares are good indicators of exchange shares. The Huffington Post collected enrollment data for eight states (CA, CT, MA, MN, NV, NY, RI, WA). Using their reported data (which excludes some small players) for states other than MA (which had an exchange prior to 2011), we calculated predicted exchange market shares using 2011 CCIO data (and excluding United). Insurers that entered in 2014 but were not present in 2011 are assigned a share of 0 in 2011. Insurers present in 2011 but not participating in the exchanges are excluded. The correlation between our predicted shares and the actual 2014 shares was 0.63. (Data source: http://www.huffingtonpost.com/2014/01/27/health-insurance-obamacare_n_4661164.html.)

market with just one rival (ΔHHI = 1800) than in a market with, say, 3 equally-sized rivals (each with pre-exchange market share of 30 percent, yielding ΔHHI =533). As a robustness check, however, we also examine results using United's pre-exchange share in place of ΔHHI.

3.2 Additional Controls

We supplement our dataset with a number of controls that may affect healthcare costs, insurance preferences, or the competitive environment in a ratings area. The first of these measures is *hospital price*, constructed using 2007–2009 hospital-level data from the Centers for Medicare & Medicaid Services' Healthcare Cost Report Information System (HCRIS) dataset.[24] Hospitals account for roughly one-third of spending by private insurance plans, hence hospital prices are a significant determinant of premiums. We follow the methodology in Dafny (2009), which calculates price as the net inpatient revenue per case-mix adjusted, non-Medicare admission.[25] Although it would be preferable to exclude Medicaid admissions from this price measure, as hospitals are paid largely fixed rates for these patients, the HCRIS data on Medicaid revenues is exceedingly noisy.

Per Dafny and Ramanarayanan (2012), nonprofits with significant market share charge lower premiums, ceteris paribus, than for-profits. We control for this by including the expected market share of nonprofit insurers, *Share NFP*, using the same methodology to assign shares that we used to calculate *HHI*. We account separately for the presence of a nonprofit CO-OP using a dummy variable (which varies at the ratings-area level).[26] Both *Share NFP* and *CO-OP* are likely to be endogenous. However, the similarity of the results with and without controls tempers concerns that their inclusion biases the effect of interest (i.e., how competition affects price).

Last, we include a parsimonious set of demographic controls in our main specification: *per capita income* for 2011 from the Bureau of Economic Analysis, and *percent Black* and *percent Hispanic* from Census data. Although we considered many other demographic controls (such as

[24] Cost Report estimates for hospital prices shift from year to year. For example, the non-Medicare admission-weighted correlation in prices for facilities in 2007 and 2009 is 0.73. We therefore pool three years (deflating to a common year using the CPI) to improve the precision of our estimates.

[25] We use each hospital's Medicare Case-Mix Index (CMI) to adjust for admissions severity; non-Medicare CMI is not reported. Critical Access Hospitals and other hospitals not paid under Medicare's Prospective Payment System are excluded from the sample.

[26] Our methodology assigns zero share to entrants, hence the need for a separate variable. In addition, nonprofit CO-OPs are of independent interest as they are new entrants partially funded by government loans.

percent diabetic and percent uninsured) and market-level controls (such as area hospital market concentration), and (as discussed in Section 5.2 below) the key results are robust to inclusion of these controls, we did not retain them in our preferred specification for two reasons. First, the coefficient estimates display classic signs of multicollinearity, and second, multiple demographic controls absorb degrees of freedom that are particularly scarce in our falsification tests, which rely on state and MSA-level data.

Notably, we present estimates excluding all controls to illustrate their impact on the results. All regressions are weighted using the 2011 ratings-area population estimates as weights.[27]

3.3 Addressing Limitations of the Instrumental Variables Approach

To satisfy the exclusion restriction, our instrument must be correlated with predicted exchange HHI, but uncorrelated with other determinants of premiums.[28] There are two primary mechanisms by which this assumption could be violated. First, United's market share may itself capture underlying market conditions in a way that is reflected in premiums. For example, United may be able to compete more effectively in high-cost insurance markets where its ability to negotiate tough deals with providers can be most valuable. To address this concern, we use pre-HIM data to show that there is no pre-existing correlation between the instrument and insurance premiums.

Ideally, we would like to have a measure of pre-exchange premiums for individual policies at the ratings-area level. Unfortunately, these data do not exist. Therefore, we consider four distinct alternatives, each with strengths and limitations. We construct two measures of premiums from the 2011 Medical Expenditure Panel Survey Insurance Component (MEPS-IC). The first is the average estimated single enrollee (as opposed to family) premium for private-sector establishments.[29] The MEPS-IC publishes this data for large MSAs and state "residuals"

[27] The coefficients of interest are smaller, but remain statistically significant in unweighted models.

[28] A sufficient condition for United's non-entry to be an exogenous decision is for it to have been driven by United having a particularly high fixed cost to entering any FFMs. If, by contrast, United's non-participation was driven by price shocks that were unobserved to the econometrician, then the fact that United chose not to enter but that Aetna, Cigna and Humana did enter in some markets should lead us to update our priors about prices in markets in which United had been dominant. Note that this source of endogeneity biases our estimates downward – i.e. if United shunned all of the FFMs because of negative profit shocks to the markets in which it was likely to be dominant, then we would expect lower prices in market which had been United heavy. To test for this possibility, we confirmed our results are robust to excluding the states in which United had the most enrollees (i.e. larger states in which United had had a presence, like Texas, Florida and Michigan).

[29] The MEPS reports raw premiums without any case-mix adjustment.

(i.e., non-MSA areas). Therefore, the strength of this measure is that it is available at a relatively fine level of geography; our 34 states contain 79 MEPS-IC markets.[30] However, employer premiums are imperfectly correlated with individual-market premiums—in spite of the fact that both reflect local market cost and utilization trends—limiting the value of evidence that employer premiums are uncorrelated with ΔHHI (the falsification exercise).[31] Hence, we also present results using the average estimated single enrollee premium for small employers only, which is more closely linked to the individual market.[32] The limitation of this second measure is that it is only available at the state level, owing to MEPS-IC confidentiality restrictions.

Our third measure of pre-exchange premiums is the average 2011 individual market premium by state, as reported by CCIIO. (This source is also used to calculate our pre-exchange market shares, as described above.) This average premium is available for the most relevant market segment (the individual market), but only at the state level. The fourth and final measure of premiums comes from the Large Employer Health Insurance Dataset (LEHID) for 2009, the most recent year for which we have this data. LEHID is a proprietary dataset containing information on the health insurance plans (and associated premiums) offered by a sample of very large employers. The details of this data, as well as its comparability with other sources, are discussed in Dafny (2010). LEHID's main strengths are that it is available at a relatively disaggregated level of geography (our 34 states contain 98 LEHID markets),[33] and that it includes a rich set of variables we can use to control for plan and employee characteristics. However, the data are older and reflect an even more distant market segment from the individual market than the MEPS-IC all-employer sample.[34]

[30] MSAs and ratings areas do not perfectly match. We assign each ratings area to the MSA with the highest share of the ratings area's population. We follow the same procedure for assigning ratings areas to LEHID markets.

[31] Most employer-sponsored plans are self-insured, whereas all individual plans are fully-insured. Self and fully-insured plans are subject to different regulations and premium taxes, and market participants may differ across the two segments. For more details, see Dafny et al (2012). The correlation between state-level employer premiums and small employer premiums in the MEPS is 0.61.

[32] Most small group plans are fully-insured, and therefore subject to the same regulations as individual policies. In addition, state-level regulations regarding community rating (when present) are often the same for individuals and small groups.

[33] There are 139 geographic markets defined by LEHID. Most reflect metropolitan areas or non-metropolitan areas within the same state (e.g. Chicago, Northern Illinois except Chicago, Southern Illinois), although a few cross state boundaries.

[34] To improve the precision of our estimates for ΔHHI, we pool LEHID data from 2007–2009 and include both self and fully-insured enrollees when constructing insurer shares. When constructing LEHID premiums, we use only 2009 and only fully-insured enrollees, as the fully insured segment is more similar to the individual market than the self-insured segment. The falsification results are not sensitive to this decision.

A second concern with our identifying assumption is that variation in ΔHHI comes not only from variation across states in United's individual insurance market share, but also from the decisions of other insurers to participate on the HIMs in each ratings area. This arises from the fact that United's predicted share for each ratings area is defined as the ratio of its state-level share to the sum of state-level shares of all insurers participating on the exchange in that ratings area. The advantage of defining ΔHHI in this way (rather than using all insurers' pre-exchange state-level shares) is that it provides a more accurate estimate of United's likely market share in a ratings area. Some insurers are not active in all areas of a state, and this is likely a principal driver of their decision not to participate on the HIMs in these areas. The disadvantage is that participation may also depend on unobserved factors correlated with exchange premiums. For example, more insurers may wish to participate in areas where HIMs are likely to attract healthy enrollees, generating a spurious negative correlation between premiums and concentration. To the extent that these confounding factors vary at the state level, state fixed effects will address this concern. In Section 5.2, we confirm that the reduced-form coefficient of interest is indeed robust to inclusion of state fixed effects.[35]

We also construct a measure of ΔHHI that mitigates concerns about the endogeneity of within-state insurer participation decisions; this is accomplished by constructing insurer shares using purely ex-ante data (i.e., not conditioning upon which incumbent individual market insurers actually offered plans in a given market). We cannot rely on the CCIIO state-level data, as doing so would result in only 34 unique values for ΔHHI (and correspondingly noisy estimates). The MEPS-IC cannot be readily used to calculate insurer market shares, as there is no data field identifying the insurance carrier for each plan. Hence, we utilize the LEHID data (which, as previously noted, reflects the large group market) and data from InterStudy, a proprietary source of insurer enrollment data by MSA.[36] For both sources, we limit the data to fully-insured private insurance plans.[37] The LEHID data yields 98 unique market observations, and the InterStudy data contains 79 MSAs.

[35] Our preferred specifications do not include state fixed effects, however, as these absorb a significant amount of the variation in ΔHHI.

[36] We attempted to create additional observations for "state residuals." However, most states have MSAs that cross state boundaries, making it impossible to infer market shares for state residuals. Adding in the state residuals for which this is not a problem does not substantively change the results.

[37] The InterStudy data also contain enrollment for self-insured plans and commercial Medicaid. We examined whether the results are robust to (1) including the self-insured lives, and (2) including Medicaid lives and adding a

3.4 Summary Statistics

Table 1 presents population-weighted summary statistics for the 395 ratings areas ("exchange markets") in FFM states. Exchange markets are highly concentrated: the average number of insurers per market is only 3.9. Predicted HHIs are correspondingly very high, with an average of 7,323, much greater than the DOJ/FTC threshold of 2,500 for "very concentrated." We caution that these HHIs are overstated because our methodology does not allocate share to entrants (who do not appear in the CCIIO data). Nearly 30% of people live in markets with one to two insurers, and half live in markets with three or fewer insurers.[38] Despite the relatively small number of insurers, most ratings areas feature a large number of plans: the mean is 50.9 (including all metal tiers), and 17.2 for silver plans only. The predicted share of nonprofit insurers averages 61%. One in three markets contains a CO-OP.

Figure 4 is a histogram depicting the number of ratings areas with different ranges of ΔHHI. The figure reveals that the predicted impact of United on market concentration is large and varies significantly across markets. The population-weighted mean of ΔHHI is 1,644, which is similar in magnitude to the change in HHI that would result from a transition from three to two evenly sized firms.

Figure 5 presents information on the identities of the firms that offer one of the two lowest silver premiums in exchange markets. The Blues offer the plurality of low-premium exchange plans (57%), which is unsurprising given their high market shares in pre-exchange individual insurance, low premiums, and near-universal participation in HIMs.[39] As a first hint that CO-OPs are associated with lower *2LPS*, we find they are often represented in the bottom two. Significantly, for-profit incumbents (i.e., firms like United) offered 20% of these low-priced plans.

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separate control for Medicaid's share of covered lives. In both cases, the main results remain qualitatively similar, but the coefficient on ΔHHI ceases to be significant at conventional levels.

[38] Because more populous markets tend to have more competitors, the average market is less competitive than the population-weighted numbers suggest. The unweighted average number of insurers and HHI are 2.8 and 8,320, respectively.

[39] Dafny and Ramanarayanan (2012) find evidence suggesting the largest nonprofit Blues have lower premiums than comparably sized for-profit Blues.

4. The Relationship between Market Structure and Prices

4.1 Are Prices Correlated with Market Structure?

We begin by examining whether $2LCS$ is correlated with our endogenous measure of competition. More specifically, we estimate the following equation using data at the ratings-area level:

$$ln(2LCS)_m = \beta HHI_m \,[+X_m\lambda] + \varepsilon_m. \quad (4)$$

HHI_m is our estimate of market competition and X_m is a vector of optional controls, specifically ln(*Hospital Price)*, ln(*Per Capita Income), Share NFP*, *CO-OP*, *Percent Black* and *Percent Hispanic*. All observations are weighted by the 2011 ratings-area population. Results from this endogenous regression are presented in the first two columns of **Table 2**. The first column excludes the control variables, while the second column includes them. In both specifications, greater concentration is positively and significantly correlated with *2LPS*. The results imply a one-standard-deviation decrease in HHI (equal to 0.2, per Table 1, which is slightly larger than the mean decrease in HHI that would result if United entered all ratings areas) is associated with a reduction in *2LPS* of 5.6–7.2 percent. Of course, given the endogeneity concerns raised above, we are hesitant to place a causal interpretation on the findings.

4.2 Does Competition Have a Causal Effect on Premiums?

Next, we investigate whether competition has a causal effect on premiums. We posit that United's decision not to participate in any of the FFMs is a source of plausibly exogenous variation in exchange market structure. We use ΔHHI_m, as defined in Section 3.1, to instrument for HHI_m. In the following three subsections, we (1) confirm that ΔHHI_m is correlated with HHI_m; (2) show that ΔHHI_m is correlated with *2LPS*; and (3) estimate equation 4 using ΔHHI_m as an instrument for HHI_m.

4.2.1 First Stage Model

To evaluate whether ΔHHI_m is indeed predictive of changes in HHI_m, we estimate the following model:

$$HHI_m = \beta \Delta HHI_m \,[+X_m\boldsymbol{\lambda}] + \varepsilon_m \quad (5)$$

Results are presented in the third and fourth columns of **Table 2**, first excluding and then including the controls described above. Across both specifications, changes in ΔHHI_m translate into HHI_m nearly one for one, and the coefficient estimates are highly statistically significant. A number of the controls, such as income, racial composition, and *share NFP*, are significant predictors of *HHI*.

4.2.2 Reduced Form

The reduced-form model relates exchange premiums to the instrument, i.e.,

$$ln(2LCS_m) = \beta \Delta HHI_m \, [+X_m \boldsymbol{\lambda}] + \varepsilon_{m.} \tag{6}$$

The results, presented in the fifth and sixth columns of **Table 2**, imply that premiums are higher in markets where United's nonparticipation has a larger effect on predicted market competition. For example, in a market with the median weighted ΔHHI_m, we predict *2LPS* would have been 3.6 percent lower.[40] The remaining variables enter with the expected signs. We discuss them further in the following section.

4.2.3 Instrumental Variables

Finally, we estimate the IV regression

$$ln(2LCS_m) = \beta HHI_m \, [+X_m \boldsymbol{\lambda}] + \varepsilon_m, \tag{7}$$

instrumenting for HHI_m with ΔHHI_m. The results, presented in the final two columns of **Table 2**, suggest a meaningful impact of United's nonparticipation on premiums. Given the first-stage coefficient estimates are close to 1, the coefficients are very similar in magnitude to the reduced-form estimates in the adjacent columns. The results are also fairly similar to the OLS results from the first two columns, potentially mitigating endogeneity concerns with the OLS results.

To gauge the magnitude of the results, we examine how premiums would change under two scenarios: (1) United enters all FFM ratings areas; and (2) all incumbent insurers enter all FFM ratings areas in the states in which they offered individual insurance in 2011. Using the coefficient in column (8) (the specification with controls) as our central estimate, we calculate that population-weighted *2LPS* would have been 5.4 percent lower under scenario (1) and 11.1 percent lower under scenario (2). We caution that the latter estimate requires making projections

[40] Using the estimate of 0.293 from column 6 (the specification with controls), together with the median weighted ΔHHI_m of 0.12, yields exp(0.293 *0.12)= 1.036

far out of sample, where the assumption of a linear effect of changes in HHI is less likely to be valid.

The estimate for the effect of *CO-OP* on premiums is of independent policy interest. *2LPS* is 8.1% lower in markets with CO-OPs; however, as we discuss in Section 5.2 below, CO-OP location may be endogenous. The coefficients on the remaining controls enter with plausible signs and magnitudes. A 1% increase in inpatient hospital prices is associated with a ~0.2% in insurance premiums. This is the same proportion of private healthcare expenditures attributable to inpatient care for privately insured, nonelderly patients.[41]

Our reduced form estimates combine the "direct" and "indirect" effects previously described. To gauge the plausibility of our combined estimate and to attempt to disentangle the two, we performed two different exercises. As a first exercise, we simulated the effects of adding a randomly selected participant (from the set of all participants, in all ratings areas) as an "entrant" into each ratings area. We normalized the entrant's premiums to account for differences in the mean and variance of premiums across states, and we repeated the exercise 1,000 times to obtain average effects and standard errors. Details are provided in the Appendix. The results suggest that adding a randomly-selected entrant to all markets reduces the weighted-average *2LPS* by 4.5 percent, on average. As a second exercise, we removed each of the three largest FFM participants from the data and recalculated *2LPS*. Arguably, these insurers are the closest analogs to United. The resulting increases in *2LPS* averaged 4.5 percent.[42] Overall, these results suggest that the magnitudes we obtain are sensible, and that the premium increases we estimate could be driven entirely by the direct effect.

[41] Figure is from the *2012 Health Care Cost and Utilization Report*, Health Care Cost Institute, September 2013.
[42] Removing Aetna (which participated primarily through its Coventry brand, which offers Medicaid HMOs), from the calculation of *2LPS* results in a weighted average increase in *2LPS* (across the markets in which it participated) of 2.5 percent. Removing Humana or Wellpoint (separately) increases weighted average *2LPS* by 5.9 and 5.2 percent, respectively. A simple average across these estimates is 4.5 percent. We caution that the specific market participation decisions of these insurers appear to be endogenous (see footnote 13), hence this exercise is largely descriptive.

5. Robustness

5.1 Falsification Exercise

As noted earlier, there are potential concerns about the endogeneity of our instrument. In this section, we present a series of falsification tests designed to examine those concerns.

Our first test documents that ΔHHI is uncorrelated with pre-period premiums, which should allay concerns that the share of the market held by United is correlated with omitted determinants of exchange premiums. Pre-period premium data does not exist at the ratings-area level. We therefore use several sources of premium data, some available at the state level, some at roughly the MSA (and MSA residual) level, and one at the LEHID market level. Given the higher level of aggregation (relative to the ratings area), our statistical tests will have lower power, making it harder to reject the null of no correlation between ΔHHI and pre-period premiums. Hence, we compare the results from these regressions with those obtained from estimating our primary reduced-form regression (equation 6) using the same geographical market definitions. **Table 3** presents these results. To increase the comparability of estimates across different dependent and independent variables, we standardize both the dependent and independent variables (by subtracting the mean and dividing by the standard deviation). All specifications are weighted and include the set of controls from prior models.

Column (1) presents results using MEPS MSA-level data on premiums for employer-sponsored plans. Specification 1 (i.e., the top specification) examines whether our reduced-form relationship between $2LCS$ and ΔHHI from Column (6) of Table 2 is present when the data are aggregated to the MSA level. The point estimate is smaller than our estimate from the ratings-area data (i.e., 0.194 vs. 0.336), and statistically significant at $p<0.10$. In contrast, specification 2 (i.e., the bottom specification) contains no evidence of a statistically significant relationship between MEPS employer premiums in the pre-period and ΔHHI. The point estimate is near zero, albeit with large standard errors. The difference between the coefficient estimates in specifications 1 and 2 is not statistically significant at conventional levels.

Columns (2) and (3) repeat the same analysis using state-level pre-period premium data; as discussed above, both the MEPS small-employer premium data and the CCIIO individual insurance data are only available at the state level. Given the high level of aggregation, it is unsurprising that the coefficients from specification 1 (while very similar in magnitude to that in

column 1) are not statistically significant at conventional levels in either column (2) or column (3). For both dependent variables, the coefficient estimates from specification 2 are near zero, although with 34 observations our standard errors are quite large and two-sided tests of coefficient equality easily accept the null.

Column (4) repeats the analysis again using LEHID market definitions and premiums. The LEHID specifications include controls for the underlying plan and enrollee characteristics. These include *plan design factor*, which reflects the actuarial value of observed plans in the relevant market, and *demographic factor*, a summary measure capturing characteristics of the insured LEHID population (e.g. family size and gender).[43]

The point estimate in specification 1 is again two-thirds as large as our central estimate and remains significant at p<0.10. The coefficient estimate on ΔHHI in specification 2 is again near zero; there is no evidence that ΔHHI is significantly correlated with pre-period LEHID premiums. Here, the coefficients from specifications 1 and 2 are distinguishable at p=0.16.

The other major concern raised above was that our instrument conditions on insurers who choose to participate in state HIMs. To address this point, we turn to the LEHID and InterStudy datasets, which allow us to construct measures of ΔHHI using purely ex-ante estimates of market share. Column (4) replaces only the dependent variable with premiums calculated from LEHID, and utilizes the LEHID market as the unit of observation. Column (5) also replaces ΔHHI with a LEHID-based version that uses pre-exchange market shares for all incumbents. The point estimates for specification 1 are virtually the same as those reported in Columns 1-4, although the standard error is larger in column (5). In specification 2, there is no evidence that ΔHHI is correlated with pre-period LEHID premiums.

Finally, the last column of Table 3 uses ΔHHI constructed from InterStudy MSA market shares for all employers. We are only able to estimate specification (1), as we lack InterStudy premium data. The coefficient estimate is similar in magnitude to the other columns and statistically significant at p<0.10.

In summary, there is some evidence (albeit weaker and noisier) that ΔHHI is correlated with $2LCS$ even when the data are aggregated to higher levels of geography. By contrast, there is no evidence that ΔHHI is correlated with pre-exchange premiums: the point estimates in the

[43] We also include the market-level shares of plan types (Indemnity, Preferred Provider Organization, Health Maintenance Organization, and Point of Service), as well as the share of plans denoted as "consumer-directed" (i.e., high-deductible plans).

falsification exercises in specification 2 are always near 0. However, the coefficients from the exchange and pre-exchange periods are not statistically distinguishable from one another. We also find that substituting our version of ΔHHI with a measure that does not depend on incumbents' exchange participation decisions has little impact on the reduced-form point estimates.

5.2 Robustness Checks

Table 4 presents results of our reduced-form equation using other measures of premiums: the mean premium across all silver plans offered in a ratings area; the median premium across the silver plans; and the mean of within-insurer mean silver premium (i.e., a mean calculated using one observation per insurer, so as to avoid overweighting insurers with many plans). For this analysis, we exclude the state of Virginia, which has some extreme premium outliers.[44] The first column presents the results obtained using this sample and our primary dependent variable, *2LPS*. Our conclusions are robust to using these other dependent variables. The point estimates are somewhat smaller, but the differences across specifications are not statistically significant. There are a number of possible causes for the smaller estimated magnitudes obtained using these alternative premium measures.

First, the alternative premium measures have smaller standard deviations than *2LPS*, suggesting that there is less variation to explain. Second, some of the variation in *2LPS* is related to the sheer number of plans offered in a ratings area. Even if plan premiums are in expectation the same (e.g., drawn at random from the same distribution of prices), adding more plans will lower *2LPS* without affecting many other measures of premiums. Third, the coefficients could be interpreted as evidence that the effect of stronger competition is particularly great for plans in the low-priced silver segment. Finally, one may also infer that United's larger impact on *2LPS* implies it has a greater direct than indirect impact on exchange premiums.

Table 4 also shows that CO-OPs are significantly related to *2LPS*, but not to other measures of premiums. We take this, along with the relatively large share (in Figure 5) of markets in which CO-OPs are among the two lowest-price firms, as suggestive evidence that CO-OPs are decreasing *2LPS* more through the direct effect (i.e., by being one of the two lowest-price firms

[44] Three Virginia insurers (Optima, Aetna, and Innovation Health) have premiums that are extreme outliers. The mean silver premium (for a 27-year-old) across these three insurers is 885. This compares to a mean of 256 for the rest of the country.

in the market) than indirect effect (i.e., they may not—in the first year—have inspired competitors to reduce their premiums.) Due to the potential endogeneity of CO-OP locations, and the lack of an instrument for their presence, the CO-OP results are merely suggestive. Additional research on the impact of CO-OPs would be valuable, as the budget compromise of January 2013 eliminated funding to support prospective CO-OPs and slashed funds for current CO-OPs.[45]

Our results are robust to a series of other specification choices. In **Appendix Table 1,** we present reduced-form results from models including several additional controls (measured at the ratings-area level, except where otherwise noted), share of the population located in an urban area, share obese, share diabetic, whether a state is expanding Medicaid, share aged less than 19, share uninsured, Medicare fee-for-service spending per capita (to capture variation in utilization of healthcare services), hospital market concentration, and 2011 state MLRs. Variable construction and sources are described in the notes to Appendix Table 1. Adding these additional controls has a minimal impact on the coefficients of interest. In **Appendix Table** 2, we present results from a series of other specification choices: (1) excluding HIMs w/ 5+ insurers; (2) adding dummies for # of exchange insurers; (3) excluding the top and bottom 5% of ΔHHI; (4) excluding the top and bottom 5% of *2LPS*; (4) allocating entrants 5% share; (6) including state fixed effects. The point estimates for the effect of ΔHHI on *2LPS* range from 0.151 to 0.669, with most remaining near 0.3 and all statistically significant at the 5% level. Finally, we also estimate a reduced-form model replacing ΔHHI with United's pre-exchange market share. This alternative instrument is also a significant predictor of *2LPS* (with $p<0.01$), but the implied effect of United's presence on *2LPS* is smaller. The smaller estimated effect is expected given that share is a less accurate indicator of United's effect on market competition than predicted change in HHI.

[45] By December 2012, the federal government had awarded $2 billion in loans, out of $6 billion initially set aside by ACA. In January 2013, Congress eliminated all but ~ $200 million of the remaining funds, and this sum was designated to support the 24 CO-OPs already existing at that time. Thirteen of these CO-OPs offered plans in 2014. *Source:* "Health Policy Brief: The CO-OP Health Insurance Program," Health Affairs, February 28, 2013. Available from: http://healthaffairs.org/healthpolicybriefs/brief_pdfs/healthpolicybrief_87.pdf.

6. Conclusion

In this study, we evaluate the impact of insurer participation and competition in the FFMs on premiums. We find that exchange premiums are responsive to competition. To contend with the endogeneity of exchange market structure, we exploit the decision by United to forgo participation in the FFMs. This decision differentially impacted markets due to United's pre-exchange market position.

We estimate that the population-weighted average second-lowest silver premium would have been reduced by 5.4% had United entered all markets. If all insurers present in a state had entered all ratings areas in that state's exchange, we predict FFM premiums would have been 11.1% lower. We also find that markets with CO-OPs have lower premiums. A portion of this association is attributable to a "direct effect" because CO-OPs are often among the two lowest-price silver plans in a market; their premiums directly lowered the weighted average *2LPS* by 2.1 percent.[46]

The magnitude of the relationship between HHI and exchange premiums is roughly one-third that obtained by Dafny et al. (2012) for the large-employer group market. Although the estimates are not perfectly comparable (in particular, the Dafny et al. estimate reflects the cumulative effect of changes in HHI on premium growth over a few years' time), the similar order of magnitude suggests that the competitive dynamic characterizing early exchange markets is akin to that of the mature, but imperfectly competitive, large-group market. This suggests that HIMs have not (to date) produced a Bertrand-like outcome in which a small number of players can drive premiums down to cost.

Future entry, firm learning, consumer learning and greater plan standardization may change this assessment. There is room for significant learning on both sides of this market. For example, over time consumers are likely to learn how to better compare different plan attributes, like premiums, actuarial value and network design. Tools to facilitate these comparisons and to help consumers prioritize attributes will also improve. Changes in the shapes of consumer demand curves will in turn affect pricing. Relatedly, insurers' uncertainty about who their competitors will be, what the pool of consumers will look like, and what kinds of products will be attractive to those consumers will resolve. While impossible to sign definitively, most of these forces are likely to make the cross-price elasticities of

[46] To obtain this estimate, we recalculated *2LPS* without CO-OPs in the sample of markets with a CO-OP and compared it to actual *2LPS*.

demand across insurers higher for a given market structure. Under these circumstances, margins will decline faster with a move from one to two insurers. Once pricing nears the competitive level, however, additional competitors will have a smaller incremental effect.

Given the incipiency of these markets, this study is but a first step in what will surely become a deeper and broader literature on insurance HIMs and the nature and significance of competition among exchange participants. There is substantial room for further research on how competition affects pricing and other outcomes in this market. Future studies will be easier to execute once information about consumer enrollment decisions has been released, and once the market is in longer-term equilibrium. These conditions will allow researchers to apply well-established supply-side methodologies to studying competition on the HIMs. Such research will permit more-nuanced conclusions and recommendations regarding the impact of competition and competition-related policies on various outcomes of interest. Given the large federal role in developing and regulating the HIMs, and in subsidizing the purchase of plans offered on the HIMs, research on how competition affects consumer choice and insurer behavior is of critical importance.

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Appendix: Simulating the Effect of an Entrant of *2LPS*

We performed a simulation exercise to determine the impact of introducing one entrant to every market on weighted average *2LPS*. Restated, we take each existing market, add an entrant, and calculate the change in *2LPS*. The exercise contains five steps:

1. We create a dataset containing the lowest silver premium offered by every insurer participating in each ratings area (N=1,109). For each state, we then calculated the mean and standard deviation of the distribution of participants' lowest silver premiums.
2. We select an entrant for each of the 395 ratings areas by drawing 395 insurers from the dataset of 1,109 insurer x ratings areas and then assuming that entrant made all of its silver offerings available in the new market.
3. We re-normalized the entrant's premiums so as to make them similar to the premiums in state the insurer is entering (the "entering state"), rather than the state from which it was drawn (the "home state"). More specifically, we studentize the entrant's premiums by subtracting the home state's mean and dividing by the home state's standard deviation determined in step 1. We then renormalize the studentized premiums by multiplying by the entering state's standard deviation and adding the entering state's mean determined in step 1.[47]
4. We recalculate *2LPS* in each ratings area, and produce a weighted average change in *2LPS* across all 395 ratings areas.
5. We repeated steps 1-4 1,000 times.

As reported in the text, we find that adding a randomly-selected insurer to all markets decreases the population-weighted *2LPS* by 4.5 percent, on average. The 5th percentile of the distribution of weighted average premium reductions is 3.8 percent, and the 95th percentile is 5.3 percent. These numbers are relatively similar to our estimate of 5.4 percent for the effect of United's non-entry, which as previously noted includes a (likely small) indirect effect.

[47] Note that one could calculate a state mean and standard deviation from a number of different samples. We use the sample of lowest premiums across insurers as our focus is on lower order statistics of premiums. For example, using all silver premiums would overweight the significance of many plans that will not affect *2LPS* and are unlikely to attract enrollees.

Table 1: Summary Statistics for Federally Facilitated Marketplaces

Variable	Mean	St Dev	Min	Max
Number of Insurers	3.9	2.0	1	9
Number of Plans	50.9	29.6	7	169
Number of Silver Plans	17.2	10.3	2	48
Price of 2nd Lowest Price Silver Plan (2LPS)	214	37	138	395
Under 65 Population	443,830	759,394	7,391	7,612,795
Income per Capita ($)	39,519	7,176	19,049	65,173
Hospital Price ($)	6,597	1,392	3,447	11,906
COOP Present on Exchange	0.33	0.47	0.00	1.00
Share Non-Profit	0.61	0.38	0.00	1.00
% Black	0.16	0.12	0.00	0.75
% Hispanic	0.15	0.15	0.01	0.96
United Market Share (if Participating in Exchange)	0.16	0.12	0.00	0.98
Predicted Exchange HHI (United is not participating)				
HHI	0.73	0.20	0.32	1.00
Predicted Exchange HHI (if United were participating)				
$HHI_{\text{plus United}}$	0.57	0.17	0.24	0.99
Implied ΔHHI				
ΔHHI	0.16	0.11	0.00	0.49

Notes: N=395. The unit of observation is the ratings area. There are 395 ratings areas in the 34 states with federally facilitated marketplaces. Price for the 2nd Lowest Price Silver Plan is the individual premium for a 27 year old. Premiums move proportionally with age. Hospital Price is defined as net revenue per case-mix adjusted discharge, excluding Medicare revenues and discharges, per Dafny (2009). It is constructed using Medicare's HCRIS database. For each ratings area, we use the discharge-weighted average of prices for hospitals located in the area. Share Non-Profit is constructed using the 2011 individual insurance market shares of non-profit insurers participating in the exchange, as reported by CMS' Center for Consumer Information and Insurance Oversight (CCIIO). Summary statistics for variables other than population are reported on a population-weighted basis.

Table 2: Main Results

	Endogenous Regression		First Stage		Reduced Form		Instrumental Variables	
	Dep Var = ln(2LCS)		Dep Var = HHI		Dep Var = ln(2LCS)		Dep Var = ln(2LCS)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HHI	0.274***	0.348***					0.260***	0.336***
	(0.040)	(0.041)					(0.079)	(0.083)
ΔHHI			0.954***	0.871***	0.248***	0.293***		
			(0.081)	(0.079)	(0.079)	(0.078)		
ln(Per Capita Income)		0.058		-0.138***		0.009		0.055
		(0.045)		(0.049)		(0.048)		(0.048)
ln(Hospital Price)		0.183***		-0.011		0.179***		0.183***
		(0.038)		(0.041)		(0.041)		(0.038)
COOP in Market		-0.086***		0.022		-0.078***		-0.085***
		(0.017)		(0.019)		(0.019)		(0.018)
Share Non-Profit		-0.077***		0.157***		-0.023		-0.075***
		(0.022)		(0.023)		(0.023)		(0.024)
% Black		0.156**		0.241***		0.240***		0.159**
		(0.064)		(0.069)		(0.068)		(0.066)
% Hispanic		-0.087*		-0.281***		-0.186***		-0.091
		(0.052)		(0.055)		(0.054)		(0.056)
R-sq	0.105	0.290	0.259	0.398	0.025	0.185	0.105	0.289

Notes: N=395. All regressions are weighted by the ratings-area population under 65, as reported by the U.S. Census. The instrument for HHI is ΔHHI.

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<.01

Table 3: Reduced Form Falsification Exercise

	(1)	(2)	(3)	(4)	(5)	(6)
Source of Pre Period Premiums	MEPS, all firms	MEPS, small firms	CCIIO	LEHID	LEHID	N/A
Source of ΔHHI	CCIIO	CCIIO	CCIIO	CCIIO	LEHID	InterStudy
Specification 1 (Confirmation that main results persist):						
Dep Var = ln(2LCS), studentized						
ΔHHI (Studentized)	0.194*	0.174	0.174	0.188*	0.179	0.149*
	(0.113)	(0.180)	(0.180)	(0.101)	(0.170)	(0.089)
Specification 2 (Falsification):						
Dep Var = ln(Pre Period Premiums), studentized						
ΔHHI (Studentized)	0.029	0.011	0.039	0.018	-0.033	
	(0.113)	(0.147)	(0.159)	(0.061)	(0.104)	
Number of Observations	79	34	34	98	98	248
Unit of Observation	MSA	State	State	LEHID Market	LEHID Market	Ratings Area
P-value for H_0: identical effect of independent variable on both dependent variables	0.30	0.48	0.58	0.16	0.30	

Notes: All regressions are weighted by the ratings-area population under 65, as reported by the U.S. Census.

MEPS MSA definitions break states into MSAs and state residuals (i.e., areas outside the MSAs).

All specifications include the controls in the even columns in Table 2. Regressions with a LEHID dependent variable also control for plan type shares, plan design factor, and demographic factor. The standard errors in column 6 are clustered at the MSA level (196 clusters).

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table 4: Reduced Form
Effect of ΔHHI on ln(Prices)
(Robustness to Alternative Measures of Prices)

	(1)	(2)	(3)	(4)
	Dep Var = ln(2LCS)	Dep Var = ln(Mean Premium)	Dep Var = ln(Median Premium)	Dep Var = ln(Mean of Within-Insurer Mean Premiums)
ΔHHI	0.293***	0.162***	0.182***	0.175***
	(0.079)	(0.057)	(0.062)	(0.055)
ln(Per Capita Income)	-0.013	0.058	0.097**	0.061*
	(0.053)	(0.038)	(0.041)	(0.037)
ln(Hospital Price)	0.197***	0.169***	0.151***	0.161***
	(0.043)	(0.031)	(0.033)	(0.030)
COOP in Market	-0.079***	-0.009	-0.002	-0.000
	(0.019)	(0.014)	(0.015)	(0.013)
Share Non-Profit	-0.018	-0.032*	-0.051***	-0.018
	(0.024)	(0.017)	(0.019)	(0.017)
% Black	0.260***	0.175***	0.218***	0.105**
	(0.070)	(0.050)	(0.055)	(0.049)
% Hispanic	-0.187***	0.070*	0.131***	0.049
	(0.054)	(0.039)	(0.042)	(0.038)
R-sq	0.190	0.173	0.185	0.160

Notes: N=383. All regressions are weighted by the ratings-area population under 65, as reported by the U.S. Census. Samples exclude Virginia, which has very large pricing outliers. When Virginia is included, specifications utilizing a mean premium (i.e., columns 2 and 4) yield statistically insignificant coefficients on ΔHHI.
Standard errors in parentheses * p<0.10, ** p<0.05, *** p<.01

Figure 1: Few Insurers in Many Markets

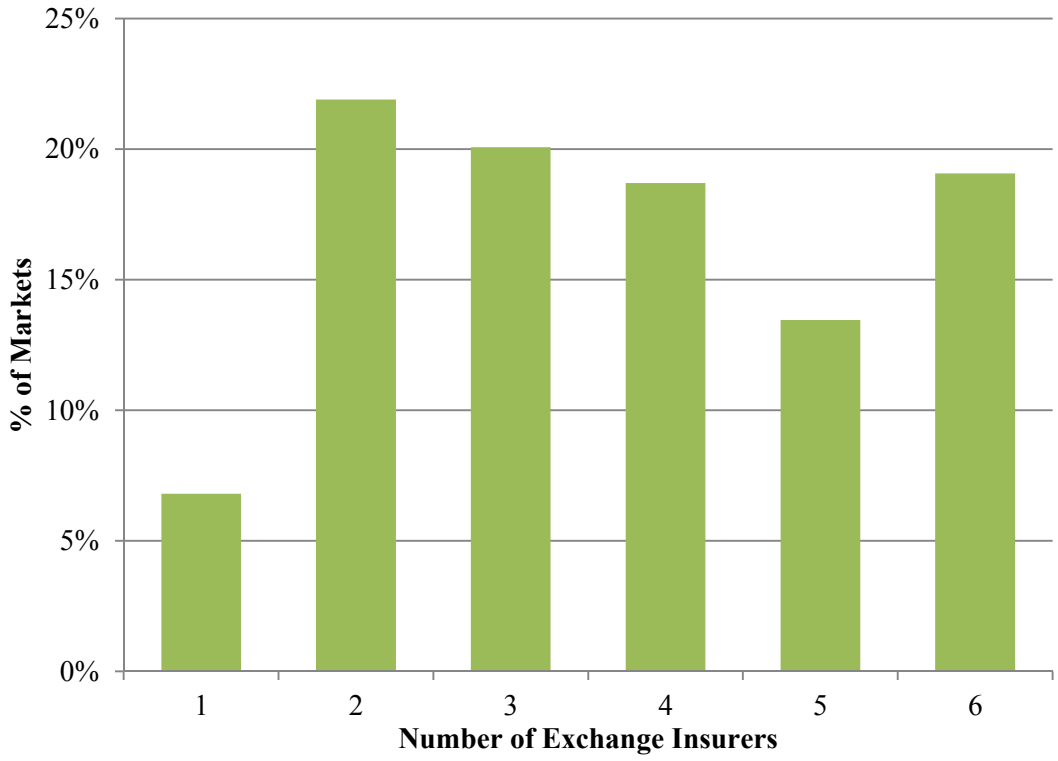
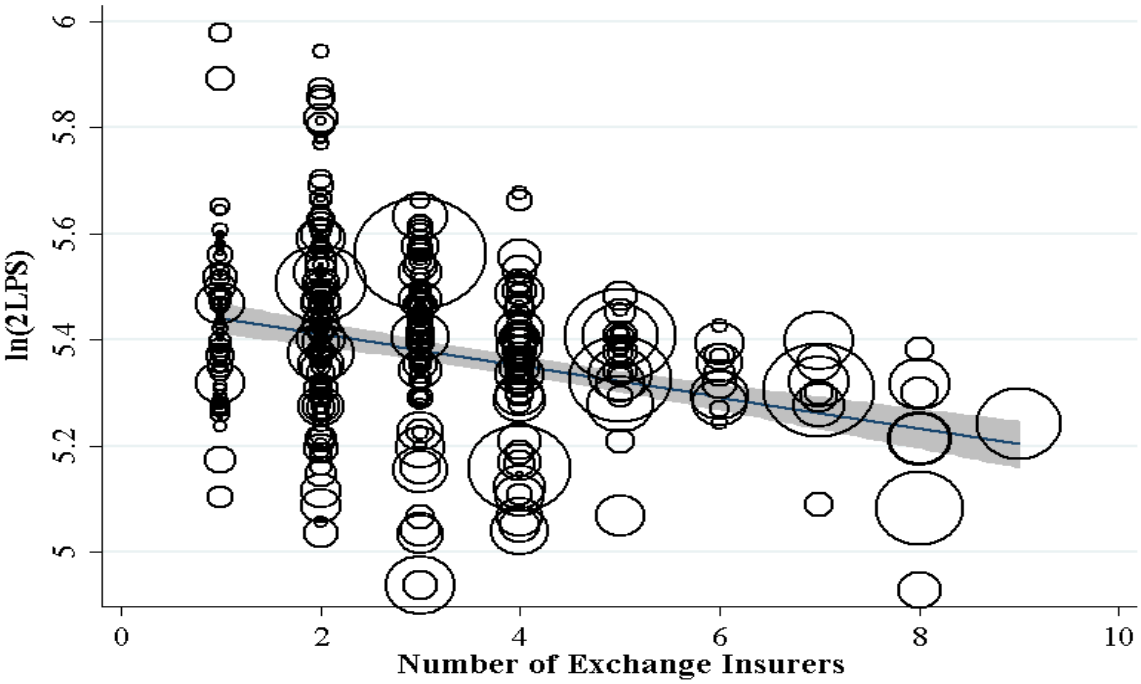
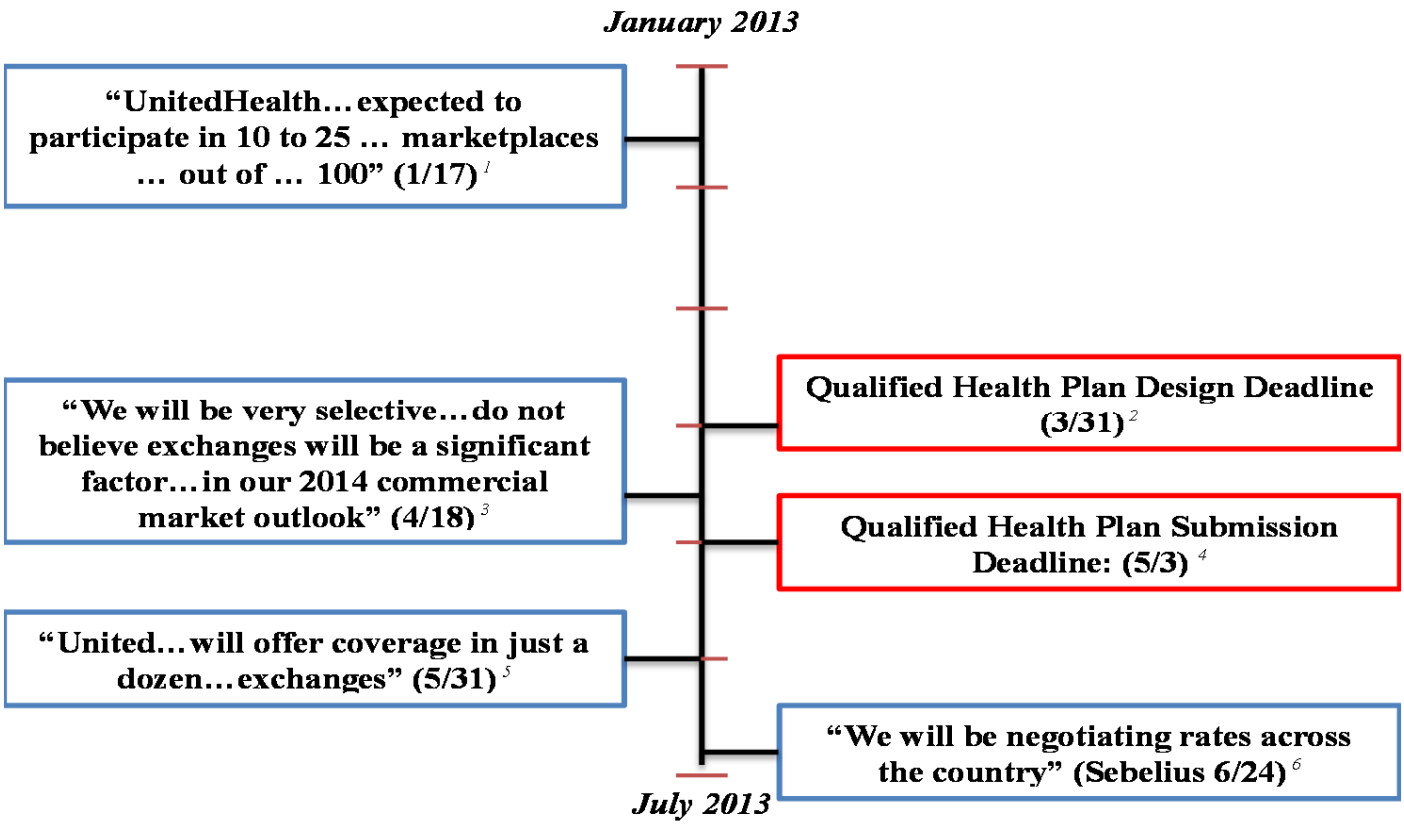


Figure 2: More Insurers Means Lower Premiums



Notes: Scatter plot reflects 395 ratings areas, with circle sizes corresponding to population. Figure also contains weighted regression line and and 95 percent shaded confidence interval.

Figure 3: Could United have Affected Rivals' Pricing?



[1] http://online.wsj.com/news/articles/SB10001424127887324468104578247332079234240.

[2] http://www.healthreformgps.org/resources/cms-extends-qhp-application-deadline/

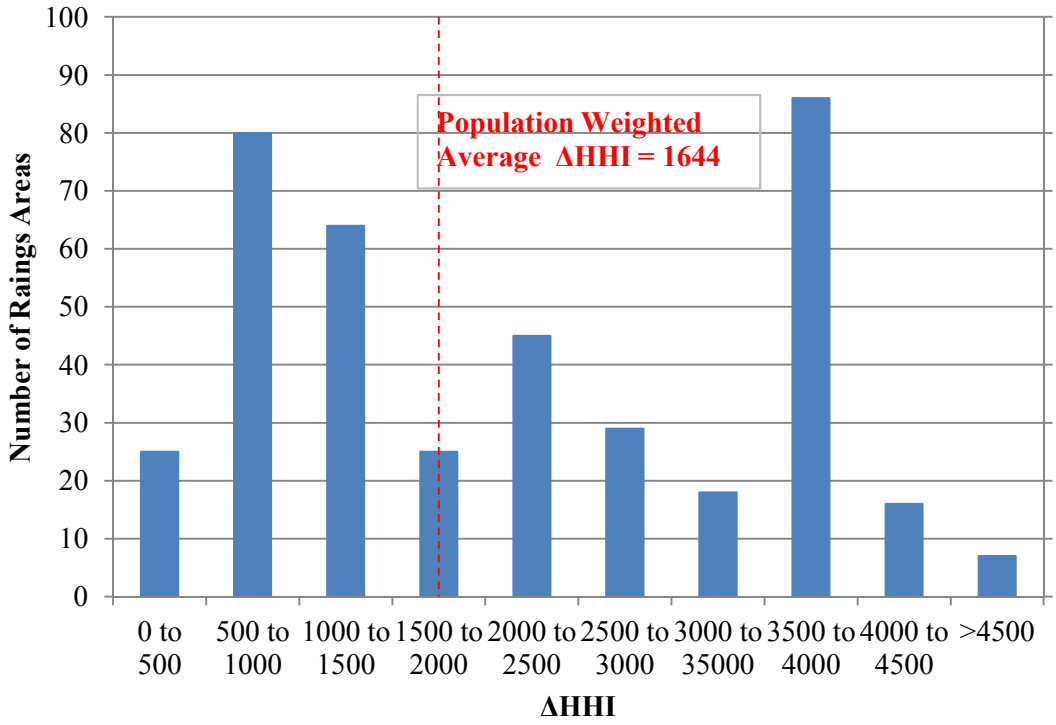
[3] http://www.lifehealthpro.com/2013/04/18/unitedhealth-to-be-very-selective-exchange-user

[4] http://www.cms.gov/CCIIO/Resources/Fact-Sheets-and-FAQs/Downloads/marketplace-timeline-narrative.pdf

[5] http://www.bloomberg.com/news/2013-05-30/unitedhealth-spurs-obama-exchanges-as-rules-stall-profit.html

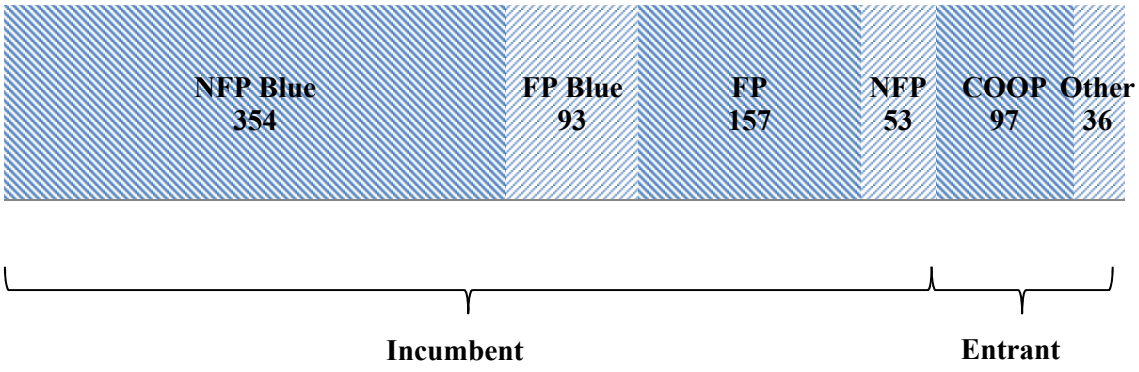
[6] Sebelius asserted, "We will be negotiating rates across the country." While HHS lacks the authority to "actively negotiate" with plans (i.e., exclude plans if their rates are too high), HHS may have had other levers to negotiate with insurers, and insurers would likely have been free to revise premiums downward at this point http://capsules.kaiserhealth news.org/index.php/2013/06/sebelius-administration-is-negotiating-rates-in federalexchanges/

Figure 4: Predicted Impact of United's Decision



Notes: N=395

Figure 5: Identity of 1st and 2nd Lowest-Priced Silver Insurers, by Category



Notes: N=790

Appendix Table 1: Robustness To Inclusion of Extra Controls

	Endogenous Regression		First Stage		Reduced Form		Instrumental Variables	
	Dep Var = ln(2LCS)		Dep Var = HHI		Dep Var = ln(2LCS)		Dep Var = ln(2LCS)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HHI	0.348***	0.283***					0.336***	0.294***
	(0.041)	(0.044)					(0.083)	(0.084)
ΔHHI			0.871***	0.884***	0.293***	0.260***		
			(0.079)	(0.077)	(0.078)	(0.079)		
ln(Per Capita Income)	0.058	0.195***	-0.138***	0.263***	0.009	0.269***	0.055	0.192***
	(0.045)	(0.067)	(0.049)	(0.067)	(0.048)	(0.069)	(0.048)	(0.070)
ln(Hospital Price)	0.183***	0.206***	-0.011	0.050	0.179***	0.220***	0.183***	0.205***
	(0.038)	(0.037)	(0.041)	(0.038)	(0.041)	(0.039)	(0.038)	(0.037)
COOP in Market	-0.086***	-0.079***	0.022	0.048**	-0.078***	-0.067***	-0.085***	-0.081***
	(0.017)	(0.020)	(0.019)	(0.020)	(0.019)	(0.021)	(0.018)	(0.021)
Share Non-Profit	-0.077***	-0.093***	0.157***	0.164***	-0.023	-0.046**	-0.075***	-0.094***
	(0.022)	(0.022)	(0.023)	(0.022)	(0.023)	(0.023)	(0.024)	(0.023)
% Black	0.156**	0.252**	0.241***	0.265**	0.240***	0.328***	0.159**	0.250**
	(0.064)	(0.101)	(0.069)	(0.103)	(0.068)	(0.106)	(0.066)	(0.099)
% Hispanic	-0.087*	-0.308***	-0.281***	-0.017	-0.186***	-0.312***	-0.091	-0.307***
	(0.052)	(0.096)	(0.055)	(0.097)	(0.054)	(0.099)	(0.056)	(0.094)
% Urban		-0.294***		-0.413***		-0.411***		-0.290***
		(0.067)		(0.065)		(0.067)		(0.072)
% Obese		-0.841*		-1.227**		-1.200**		-0.839*
		(0.494)		(0.512)		(0.522)		(0.484)
% Diabetic		-1.129		4.262***		0.071		-1.182
		(1.244)		(1.249)		(1.275)		(1.267)
Medicaid Expansion		0.029		-0.006		0.027		0.029
		(0.019)		(0.020)		(0.021)		(0.019)
% Less than 19		1.284***		1.347***		1.670***		1.274***
		(0.417)		(0.424)		(0.433)		(0.413)
% Uninsured		0.898***		0.342		0.991***		0.890***
		(0.315)		(0.321)		(0.327)		(0.313)
ln(Medicare FFS)		0.225***		-0.294***		0.141*		0.228***
		(0.075)		(0.075)		(0.077)		(0.075)
HHI (Hospital)		0.141***		0.135***		0.178***		0.138***
		(0.039)		(0.040)		(0.041)		(0.042)
MLR bite		0.518***		0.464**		0.650***		0.514***
		(0.190)		(0.193)		(0.197)		(0.188)
R-sq	0.290	0.388	0.398	0.548	0.185	0.339	0.289	0.388

Notes: N=395. All regressions are weighted by the ratings-area population under 65, as reported by the U.S. Census. The instrument for HHI is ΔHHI. The odd columns are reproduced from Table 2. Additional controls are from the most recent year of data available. % Urban is derived from the 2010 Census Urban and Rural Classification data. % Obese and % Diabetic are from the Centers for Disease Control and Prevention for 2010 and 2009, respectively. The state Medicaid expansion indicator is from the Kaiser Family Foundation. % Less than 19 refers to the under-65 population in 2011, and is obtainted from the U.S. Census. % Uninsured is from the Census's 2010 Small Area Health Insurance Estimates and refers to the population under 65. Combined Part A and B spending per Medicare Fee For Service enrollee is from 2011 data reported by the Centers for Medicare and Medicaid Services. HHI (Hospital) is calculated using 2011 American Hospital Association ownership data, combined with non-Medicare discharge data from the 2011 HCRIS data. MLR bite is equal to 0.85 minus the state's Medical Loss Ratio, calculated using 2011 state MLR data. * p<0.10, ** p<0.05, *** p<.01

Appendix Table 2: Robustness Checks of Reduced Form Model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ΔHHI	0.293***	0.296***	0.187**	0.358***	0.151**	0.422***	0.659***
	(0.078)	(0.087)	(0.078)	(0.099)	(0.061)	(0.089)	(0.141)
Explanation	Original	Excludes ratings areas with 5+ firms	Adds dummies for # of firms	Excludes 5% tails of ΔHHI	Excludes 5% tails of ln(2LPS)	Give entrants 5% share	State FEs
N	395	343	395	367	357	395	395
R-sq	0.185	0.166	0.290	0.162	0.120	0.202	0.706

Notes: All regressions are weighted by the ratings-area population under 65, as reported by the U.S. Census.
Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<.01