Competing under New Rules of the Game: An Analysis of Insurer Entry and Premiums for Exchange-Based Coverage

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Introduction

The individual or "non-group" market for health insurance is expected to grow in size from an estimated 10 million in 2009 to 27 million covered lives by 2024 with the changes introduced by the Patient Protection and Affordable Care Act of 2010 (ACA) (Abraham et al. 2013; CBO, April 2014). This occurs at a time of large regulatory changes in the insurance industry, the introduction of substantial means-tested subsidies for the purchase of non-group coverage, and the application of a fine for those who remain uninsured. The customer experience of purchasing insurance in the individual market is also changing, from one based on brokers and traditional media marketing to the use of an online marketplace that facilitates comparison shopping as in other areas of consumer product choices. These factors change the demand for coverage, as well as the rules that insurers must follow. In this study, we examine the determinants and consequences of insurer entry in this post-ACA market. We first investigate the determinants of insurers' entry into the Exchange-based individual market in 2014 and then evaluate the implications of insurer entry with respect to the premiums and plan choices faced by consumers.

Background

Several provisions within the ACA address concerns about the functioning of the individual market for health insurance, including high administrative loading fees, access problems for individuals with poor health status, adverse selection, and limited choice of plans. Historically, the individual market has served as a residual source of health insurance for the non-elderly population when they do not have access to either employer-sponsored coverage or public programs, such as Medicaid.

Beginning in 2014, the ACA creates online marketplaces (also known as Exchanges) through which individuals can shop for and purchase coverage. Exchanges are also the mechanism through which lower-income Americans (100-400% FPL) without offers of affordable employer coverage or Medicaid may obtain premium and cost-sharing subsidies toward the purchase of an individual health plan. The ACA legislation allowed states to have their own state-based Exchange or to default to one run by the federal government. In the initial year, 16 states and the District of Columbia had their own exchanges, while 34 states opted for either a federal or federal-state partnership exchange design.

The regulatory environment for individual health insurance has fundamentally changed in most states as a result of ACA provisions. Early enacted provisions included a minimum medical loss ratio requirement of 80 percent in the individual market as well as a requirement for states to have an effective process by which insurers' premium rates are reviewed for compliance with regulations prior to being offered to customers. In 2014, many other regulatory changes focusing on premiums and benefit design were also enacted. These included standardization of insurance plans based on actuarial value (e.g., a catastrophic plan for those 30 years of age or younger, and bronze, silver, gold, platinum levels at 60%, 70%, 80% and 90% actuarial value, respectively) and modified community rating, with premium variation limited to age (3:1), tobacco use (1.5:1), and geographic rating area.[1]

The designation of geographic rating areas introduces premium variation that is intended to reflect significant differences in health care unit costs as noted by insurers and

[1] Other changes included the creation of an essential benefits package as well as limits on deductibles, out-of-pocket maximum requirements, and annual and lifetime limits. See www.hhs.gov/healthcare/rights/index.html for further key features of changes to the rules of the insurance market.

other stakeholders within a given state. Federal rule-making gave states some flexibility in terms of their preferred approach for defining rating areas. For 2014, states were most likely to opt for clusters of counties, although in general, insurers were not required to sell coverage within all counties in a given rating area. Together, changes in the marketplace and the regulatory environment have the potential to alter the structure and conduct of insurers in the individual market with important implications for consumers' access to and affordability of health insurance.

Prior Literature:

Within the economics literature, insurer entry and the effects of insurer competition on premiums have been studied across a number of different market segments. Analyses from the 1990s examine the effect of the increasing number of competitors on insurance premiums in commercial HMO markets (Wholey et al., 1995; Pauly et al., 2002) and find that an additional competitor in a regional market led to lower premiums or lower insurance company profits. Also studying HMOs, Dranove, Gron, and Mazzeo (2003) utilize a Bresnahan and Reiss (1991) framework to examine competition among different types of HMOs, focusing on whether differentiation based on local versus national geographic scope makes competition less intense than if HMOs were all of one type. Competition within product types is quite strong, but the introduction of HMOs of the other product type does little to increase the extent of competition. Other factors including population, older population share, and the share of large business establishments are positively related to HMO entry, whereas per capita income and state regulations are inversely related.

Focusing on the large employer group market, Dafny et al. (2012) examine the effect of a substantial merger between two national insurers on premiums. They find evidence

that the merger lead to more concentrated markets and thus contributed to premium increases. Guardado et al. (2013) study the small employer group market in Nevada, also taking advantage of a merger between two insurers, and find that more concentrated insurer markets lead to higher prices there too.

Within markets serving Medicare beneficiaries, Lucarelli, Prince and Simon (2012) find in the context of Part D that adding dimensions of product differentiation can reduce competition, although consumer welfare could be enhanced through the addition of valued characteristics. Thus, standardization of plans in the Exchange could serve to encourage competition's beneficial effects on premiums. Starc (forthcoming) finds evidence of lower competition leading to higher premiums in the Medigap market, because of the low price elasticity and consumer preferences for insurer brands. She also finds that profits are possible for segments of the market that abet marketing of the plans to consumers in addition to the insurers. This study highlights differential insurer behavior when facing an inelastic demand curve (as could happen through subsidization of the Exchanges).

For the individual market prior to the ACA, Karaca-Mandic, Abraham, and Simon (2013) examine an insurer's premiums per member month as a function of insurer and market characteristics using panel data from the National Association of Insurance Commissioners (NAIC) for 2001-2009. They do not find average premiums (measured as the natural log) to be significantly related to the individual insurance market structure, as measured by a set of indicators for number of insurers (1, 2-4 and 5+ (reference)). However, this study is observational, and lacks an instrumental variables technique to account for potential endogeneity of competition. Another study by Starc and Ericson (2012b) simulates pricing under perfect competition for the Massachusetts health insurance

exchange (non-group market) and conclude that pricing in that market indicates the presence of consolidation in the insurance industry.

A budding literature examines insurer behavior and market outcomes in the post-ACA period. Examining entry into Exchanges by insurers at the state-level, Abraham, Feldman, and Simon (forthcoming) estimate that 22% of large incumbent insurers, defined as those who had active operations in the individual, group, FEHBP, or Medicaid market segments and at least 1,000 covered lives in 2012, were Exchange participants in the initial year. They find insurer participation to be positively related to size and scope of the insurer's operations and dominant insurer status (e.g., having more than 50 percent market share across all major segments). In contrast, insurer participation is negatively related to national group affiliation. The authors find no statistically significant effects of prior experience in the individual market or state policy decisions on insurer entry.

Several other studies have examined the determinants of premiums for Exchange-based plans. Heim et al (2014) examine tax data for the self-employed in 2013, which provides a comprehensive source of individual market premiums not available elsewhere prior to the ACA. Comparing these premiums to the Exchange-based second lowest silver plan premiums, they found these plans were only 4.2% higher. The existence of subsidies for premiums and cost sharing make the prices faced by consumers 42.3% lower. This contrasts with earlier reports from data extrapolated from healthcare.gov and other sources, pre and post ACA for plans in the most populous zip codes in each state showing that premiums were 49% higher (Roy, 2014). In an ASPE research brief, Burke et al. (2014) examines the relationship between the number of issuers in a geographic rating area and premiums for the second-lowest cost silver plan. They find the number of issuers to be

inversely related with premiums; they also show premiums to be positively associated with state-level health care expenditures and inversely related to the percent of established issuers.[2] Krinn, Karaca-Mandic, and Blewett (forthcoming) also examine the relationship between Exchange-based premiums across all 50 states and the District of Columbia with the number of insurers, as well as market demographic and health status attributes, whether a state expanded Medicaid, and Exchange type (e.g., federal or state-based; clearinghouse or active purchaser). Their find that premiums are lower in markets with larger numbers of insurers and that state clearinghouse models had the lowest premiums on average in the initial year.

In an NBER working paper, Kowalski (2014) examines the impact of state policy decisions on consumer welfare. Using data on coverage, premiums, and costs and the Hackmann, Kolstad, and Kowalski (2013) model, she calculates changes in selection and mark-ups and compares groups of states based on a number of dimensions. These dimensions include whether the state ceded direct enforcement to the federal government (those states most opposed to the ACA), whether the state had its own Exchange, the degree of technology glitches within state-based Exchanges, whether a state expanded Medicaid, and the number of insurers. Perhaps not surprisingly, individuals in states with direct enforcement and those with exchange glitches fared worse relative to their counterparts. Kowalski's findings also suggest inconclusive differences in welfare across states with greater versus fewer numbers of insurers.

Finally, Dafny, Ody, and Gruber (forthcoming) investigate the role of competition on 2014 premiums within geographic rating areas in Federally Facilitated Marketplace (FFM)

[2] An established issuer is defined as one that issued a policy in the private individual market within the state during 2012 and 2013.

states. They note that compared to other settings used in the study of competition and premiums, Exchanges may provide environments more amenable to price-based Bertrand competition because of the standardization and online comparison tools. On the other hand, important features like network size, as still imperfectly visible to most consumers, and subsidies may reduce the salience of price. Insurers know that and therefore, it may soften competition. Dafny et al. instrument for market concentration (measured by the insurer Hirschman-Herfindahl Index (HHI) with state-level insurer enrollment data from 2011) using an exogenous change in HHI based upon United Healthcare's decision to not participate in Exchanges, following a method similar to Dafny et al (2012). They report that a one standard deviation decrease in HHI is associated with a reduction in the second-lowest silver plan premium of between 5.6% and 7.2%. Notably, their results do not differ substantially whether they instrument for the HHI or not, thus mitigating endogeneity concerns in this market.

Contribution

This study contributes to our understanding of insurer entry and competition in the Exchange-based individual market. Our analyses distinguish between the roles of price competition, insurers' cost heterogeneity, and variation in insurance product attributes in this market. Understanding these mechanisms is essential for understanding the relationship between entry and competition. We also adopt an instrumental variables approach that is new to the existing literature on ACA Exchanges to address potential endogeneity concerns in estimating the relationship between market structure and premiums. We examine this relationship for all types of products in the Exchange (four metal levels and catastrophic), while prior studies focused on the second lowest premium

silver plans in a market because subsidies are tied to these prices. In addition to price competition, we also examine cost heterogeneity between insurers that have entered local markets relative to the broader set of incumbent insurers in operation in that state prior to 2014. Thus we are able to understand the extent to which "more efficient" (e.g., insurers with lower general and administrative costs per enrollee) were disproportionately more likely to enter local markets. Finally, we analyze insurer entry and competition at the local level (county) rather than the geographic rating area, which is important for having a clear understanding of the choices consumers face as insurers did not have to enter each county within a rating area. In fact, we find that in 31% of all rating areas associated with the FFM, at least one insurer did not enter all counties. The distinction of the county-level and rating area level of analysis may be of particular concern for consumers residing in rural counties. Results from our analyses can inform policy discussions related to strategies for encouraging an adequate supply of insurers in local markets to ensure that the policy objectives of consumer choice of affordable insurance are met.

Conceptual Framework

The conceptual framework outlined below describes both insurers' decision-making related to entry as well as how premiums charged for insurers' products are influenced by market competition.

To examine the decision by insurers to sell Exchange-based coverage within specific counties, we draw heavily upon work by Bresnahan and Reiss (1991) (BR), but include modifications to reflect the institutional and regulatory environment of the individual market for health insurance. In what follows, we specify the structure of an insurer's

demand and costs, discuss the zero profit constraint, introduce the concept of an entry threshold, and identify how ratios of entry thresholds facilitate inference regarding firm conduct. In addition, we address relevant institutional factors that affect the applicability of this model to the health insurance industry.

The intuition behind the BR approach is that the effect of firm entry on competition can be inferred from the relationship between the number of entrants and market size. If market size has to increase a lot to cause another firm to enter, entry must signify an increase in competition and thus decrease in price because that new entrant did not have an incentive to enter at a lower market size. But if additional firms enter as the market size increases proportionally, then entry must not have changed the level of competition by much. Entry threshold ratios are the percentage increase in per-firm market size that causes entry of another firm. If this is greater than one, it indicates that entry has served to intensify competition, whereas thresholds below one signify otherwise. Other relevant factors that drive demand in a market are held constant,

Demand: We define the output of an insurer's production be a composite product called "coverage." Let per capita demand for coverage be defined as the following:

(1) $d(P, Z, X)$

where P is the price (e.g., premium), Z is product attributes (e.g., actuarial value), and X are demographic and economic factors. Demographic and economic factors may be correlated with expected demand for medical care as well as preferences for financial protection against anticipated costs associated with receipt of medical care services.

Market demand for insurance is defined in equation (2) as the per capita demand multiplied by the number of consumers in the market, *S(Y)*, such that:

$$(2)\ Q_{mkt} = d(P, Z, X) \cdot S(Y),$$

where the number of consumers is a function of the market population (Y).

With a single insurer serving a market, the individual firm's demand equals market demand. As additional insurers enter, we assume that market demand is split equally among these firms, such that demand for the nth firm's product can be expressed as:

$$(3)\ q_n = \frac{d(P_N, Z_N, X) \cdot S(Y)}{N},$$

where N refers to the total number of insurers in the market. Note that P_N and Z_N reference the equilibrium premium and product attributes with N insurers in the market.

Costs: Insurers incur both fixed and variable costs to produce coverage. Fixed costs may be associated with a building, information technology, marketing, provider contracting, and costs related to obtaining regulatory compliance. Variable costs may be incurred for customer relations, claims adjudication, and other inputs that vary with the level of production. Let the cost function be specified as the following:

$$(4)\ C_n = C(q_n; w; Z_n) + F_n.$$

The total cost for the n^{th} insurer is increasing in quantity demanded, factors that shift costs (w), product (Z) (assumed to be vertically differentiated), and fixed costs (F). We allow both fixed and variable costs to vary by insurer, assuming later entrants in the market have potentially higher variable and fixed costs.[3]

Entry Condition: For an insurer to enter a local market, it must have non-negative profits, which can be expressed as a zero profit constraint specified in equation (5):

[3] It is possible that ownership status could induce differences in cost structure. Non-profit insurers have tax advantages relative to for-profit insurers and may access tax-exempt debt financing for capital purchases.

$$(5)\ \pi_N = P_N q_N - C(q_N; w; Z_N) - F_N \geq 0.$$

Manipulating this expression, we can represent this constraint as equation (6), whereby an insurer's markup, defined as price minus average variable cost, multiplied by an individual insurer's demand, must be greater than or equal to its fixed costs.

$$(6)\ \pi_N = [P_N - AVC(q_N; w; Z_N)]\frac{S(Y)d_N}{N} - F_N \geq 0.$$

Entry Thresholds: With this expression, we can solve for the minimum population necessary to support each of the N insurers in the local market. This results in the following per firm entry threshold:

$$(7)\ S_N = \frac{S_N(Y)}{N} = \frac{F_N}{[P_N - AVC(q_N; w; Z_N)]d_N}$$

This ratio of fixed costs to variable profits per customer is useful for understanding the relationship between market size and variable profits. Assuming the costs associated with entry are constant, when variable profits increase (decrease), this decreases (increases) the minimum market population per firm that is necessary to support entry.

Ratios of Entry Thresholds: Ratios of entry thresholds provide a scale-free measure of how the level of competition within a market changes with respect to the number of firms as expressed in equation (8).

$$(8)\ \frac{S_{N+1}}{S_N} = \left(\frac{F_{N+1}}{F_N}\right) \cdot \left(\frac{(P_N - AVC_N)d_N}{(P_{N+1} - AVC_{N+1})d_{N+1}}\right)$$

If fixed costs are assumed not to increase with entry, then the first term in parentheses equals one. The second term is the ratio of variable profits per customer when there are N versus N+1 insurers in the market. If residual demand becomes more elastic with entry, then P-AVC margins should decline as the number of firms increases. Thus, this second

term in parentheses should start out at a value greater than one and converge to one when conduct is no longer changing with entry. This can occur for two types of behavior – perfect competition and cartel. Here we assume that changes in entry threshold ratios are capturing changes in competition.

There are three potential caveats worth noting. First, an insurer's margin depends on both price and average variable costs. If margins fall, we can't distinguish whether it is due to changes in prices or changes in costs driving this result. Similarly, the model assumes that fixed costs don't change with entry. If later entrants have higher costs, then the interpretation of entry threshold ratios becomes less clear as changes will depend on both the magnitude of differences in fixed costs as well as price-average cost margins. Third, product attributes (e.g., distribution of vertically differentiated product attributes, Z) might change margins through prices and or costs.

Understanding the underlying cause of the entry threshold patterns requires an examination of the relationships between entry and prices, costs, and product attributes. Prices will depend on demand shifters, the distribution of product characteristics (Z^*), and market structure. The price consequences of entry are described by γ_n in:

$$(9)\ P_n = \gamma_0 + \gamma_X X + \gamma_Z Z^* + \sum_{n=2}^{N} \gamma_n.$$

Similarly costs may be heterogeneous across firms. More efficient firms may enter markets with lower aggregate demand. In effect, entry thresholds will be smaller for more efficient firms. Consequently, cost heterogeneity would yield a positive correlation between the number of entrants and costs. Conditional on cost shifters and the distribution of product characteristics, the relationship between costs and entry is described by:

$$(10)\ C_n = \lambda_0 + \lambda_w W + \lambda_Z Z^* + \sum_{n=2}^{N} \lambda_n.$$

Multiproduct firms operate within Exchanges, including the Federally-Facilitated Marketplace. The ACA creates greater product standardization but allows for vertical differentiation through benefit generosity measured using actuarial values and characterized by metal levels (e.g., Bronze, Silver, etc.). Both the demand for and cost of insurance products should be correlated with vertically differentiated characteristics (Z). The distribution of entry costs and consumer preferences across Z may affect relationships between N, Z, X, and W. Although the theoretical form of this relationship is ambiguous, we empirically explore the relationship between Z, Y and N conditional upon X and W. Other dimensions of product characteristics, such as insurers' provider networks, may exhibit horizontal product differentiation, but cannot be fully addressed here.

Econometric Specification

We begin by studying insurers' entry decision. Entry should depend on market size (Y) as well as cost (W) and demand (X) shifters. Formally, we estimate:

$$(11)\ N^* = f_N(Y, X, W; \theta) + \epsilon,$$

where θ is a vector of parameters and ϵ is a normally distributed error term. Entry thresholds are defined by cut points, μ, such that $N = n$ if $(\mu_{n-1} < N^* \leq \mu_n)$. The ratios of these thresholds will provide evidence regarding the relationship between entry and competition.

Market characteristics may affect both the demand for and cost of health insurance. Potential demand shifters include the market's age and sex distribution, racial composition,

as well as income and education. Provider supply is expected to affect insurers' input prices; consequently, we explore the roles of per capita PCPs, OBGYNs, other specialists, and hospital beds. Similarly, per enrollee Medicare reimbursement may serve as a proxy for provider practice patterns. The distinction between cost and demand shifters may be difficult to distinguish as the value of insurance depends on expected costs, but this distinction is not necessary for our purposes.

The price and cost equations are based on Equations (9) and (10) respectively. Since we observe product-level premiums, we use product characteristics to estimate a hedonic price equation. The price for product *i* offered by firm *j* in market *m* (P_{ijm}) is a function of market-level demand shifters, product-specific characteristics, Z_{ijm} as well as the expected number of entrants, $\widehat{N}_m$. We estimate:

$$(12)\ P_{ijm} = \gamma_0 + \gamma_X X_m + \gamma_Z Z_{ijm} + f_P\left(\widehat{N}_m; \gamma_N\right) + \nu_{ijm}.$$

where $\{\gamma_0, \gamma_X, \gamma_Z, \gamma_N\}$ are parameters to be estimated and ν_{ijm} is a normally distributed error term. Conditional upon X_m and Z_{ijm}, γ_N describes the effect of market structure on prices. This equation is estimated via ordinary least squares and errors are clustered by market.

Our cost data reflect insurers' general and administrative costs per enrollee, which should not be particularly sensitive to input prices. Unfortunately, our cost data are aggregated across each insurer's products and market segments within a state. Consequently, we cannot observe variation in costs across markets (e.g., counties). We can, however, observe whether more efficient firms are more likely to enter smaller, more concentrated markets. We compare the average per capita general and administrative

costs[4] of participating firms, C_m, within each market to the average costs of all potential entrants (e.g., all health insurers within the state during 2012 who were operating in the individual, group, FEHBP, or Medicaid segments), C_s. We examine changes in the cost ratio, $\frac{C_m}{C_s}$, as a function of N_m. We also regress C_m on a set of state indicators and a function of N_m:

$$(13)\ C_m = \lambda_s + f_C\left(\widehat{N}_m; \lambda_N\right) + \omega_m.$$

The state fixed effects control for unobserved state-level differences in insurers' costs as well as factors that could shift demand (e.g., enrollment outreach efforts). This model is also estimated using ordinary least squares with errors clustered at the state level. Given the data's extremely limited within state variation we treat these models as suggestive robustness tests.

Market size may affect product characteristics as well as entry. We are particularly concerned with the possibility that products may be systematically different in larger markets with more entrants. Larger markets could, for example, have a disproportionately large share of gold and platinum products. Consumers may be willing to pay more for these products and insurers may also have higher costs (e.g., larger amount of claims adjudication). Consequently, we examine the correlation between the distribution of product characteristics, *Z*, and the number of entrants, *N*, conditional on market characteristics.

We are, of course, also concerned about the identification of Equations 11, 12, and 13. In effect, we employ market population (Y) as an instrument for the number of insurers

[4]General and administrative costs refer to insurers' costs that are not directly related to medical claims. They capture costs for rent, salaries, supplies, broker and agent commissions, etc.

(N) in the premium and cost equations. While this is a conventional identification strategy for models following Bresnahan and Reiss (1991), we cannot ignore the possibility that smaller markets may have unobserved differences in cost and demand shifters. This is particularly relevant for our cost equation given the aggregated nature of our data. Logically, identification based on structure might make sense in this context – moving from $N^* = 1$ to $N^* = 1.99$ would have no effect, but the shift from $N^* = 1.99$ to $N^* = 2$ would matter. This is unlikely to be the case for unobservable cost and demand shifters correlated with (Y), although the confidence intervals around the cut points (μ_n) are so wide that this has little practical value.

Data and Measures

Data

Our primary data source is the Qualified Health Plan (QHP) Landscape file released on the Healthcare.gov website in October 2014. This data set includes detailed information on insurer participation, products, and premiums in counties served by the FFM. We augment these data with demographic and provider supply factors from the 2010-2011 Area Health Resource File (AHRF) and the 2012 American Community Survey (ACS). Lastly, to capture insurers' general and administrative costs, we use data from the National Association of Insurance Commissioners (NAIC) annual filings (NAIC, 2012).[5]

Market Definition

[5] The NAIC does not endorse any analysis or conclusions based upon the use of its data.

The unit of analysis is a local market for Exchange-based coverage. We employ the geopolitical boundary of a county as our method for defining the market. This is based on final ACA administrative rule-making, in which most states adopted geographic rating areas that are individual counties or clusters of counties. In the vast majority of states, insurers are not required to sell coverage within all counties within a rating area. Insurers selectively enter counties within nearly one-third of rating areas. Our study population includes 2,512 counties within the 34 states served by the FFM for plan year 2014.[6] Figure 1 provides the distribution of counties by the number of competing insurers.

Measures

Based on the conceptual framework above, we are estimating models for three outcomes: the number of insurers selling Exchange-based coverage in the local market, monthly premiums; and the average costs of Exchange-based insurers.

We expect insurers' entry to depend on factors shifting demand as well as costs in the local market. Market population is a key indicator of demand for health insurance and should be highly correlated with the number of insurers. Since premium and cost-sharing subsidies are only available to individuals under age 65, we include the population under 65 in the market. To allow for a non-linear effect of market population on entry, we also include a quadratic term. Other market-level demographics include median household income (level and quadratic), urban influence code (scale from 12 (most rural) to 1 (most urban)), and the percentages of the market population that are white, male, or have a

[6] In sensitivity analyses, we estimate the models at the geographic rating area level (e.g., clusters of counties in most states) to investigate whether our results change when considering a broader market definition.

college degree (among those 25 years and older). We hypothesize that all of the factors above exhibit a positive association with the number of insurers entering the market.

From an insurer's perspective, a key issue in product development is establishing and managing the provider network from which enrollees are able to access care for covered services. We expect that insurers have better leverage in negotiations in local markets with a larger supply of providers and hospital capacity. To capture this, we include measures for per capita primary care physicians, obstetricians/gynecologists, and specialists. We also include a measure of hospital beds per capita. Finally, we include the Medicare adjusted average per capita costs (2014 dollars) to capture potential differences across local markets in physician practice patterns. We expect an inverse relationship between Medicare per capita costs and the number of insurers entering the local market.

For premium regression equation, the unit of observation is a product offered in a local market. Our dependent variable is the monthly premium (2014 dollars) for an individual who is 27 years of age and not a tobacco user. The key explanatory variable in the model is the number of insurers in the local market (N), which we hypothesize to be inversely related to premiums, ceteris paribus. Because of potential endogeneity concerns related to market structure, we use the predicted number of insurers ($\widehat{N}$) generated from the entry equation. Our identification strategy relies upon the assumption that the market size directly affects the number of insurers, but has no direct effect on premiums. In addition to using the predicted number of insurers, we consider more flexible specifications as well (e.g., binary indicators for each possible number of firms or indicators for ranges of firms (1-2; 3-5; 6 or more)). The premium regression also includes controls

for vertical differentiation across insurers' product space, including plan type (exclusive provider organization (EPO), health maintenance organization (HMO), point of service (POS), and preferred provider organization (PPO) (reference)) and actuarial value or "metal level" (Catastrophic, Bronze, Silver (reference), Gold, and Platinum). Finally, we include a set of market demographics, provider supply factors, and Medicare AAPCC rates described above to control for attributes of the local market that may be related to premiums.

For the cost equation, the dependent variable is defined as the average general and administrative costs per covered life among incumbent entrants in the local market in the s^{th} state. These data come from the 2012 NAIC annual filings data[7] for the subset of health insurers who had active operations in the state in which the county is located as of 2012.

Results

Table 1 provides descriptive statistics corresponding to the local markets, stratified by the number of insurance firms. Notably, we observe that the average number of non-elderly individuals within a market shows a positive association with the number of insurers in the market (33,193 for single insurer markets to more than 832,000 in markets with 7 or more insurers).

Entry in Local Markets

Table 2 includes the ordered probit results (parameter estimates and standard errors reported) for four model specifications. Column (1) is the baseline specification.

[7] We use the 2012 data because it is the most recent year of complete information that insurers had before having to decide whether or not to participate in exchanges during 2013.

Column (2) includes an additional measure for Medicare reimbursements per enrollee as a way to proxy for provider practice patterns. Column (3) additionally includes interactions of population with other market attributes to test for heterogeneity in the effects of these attributes with market size, and column (4) includes quadratic terms for the provider supply factors to test for more flexible relationships with the number of insurers.

Population exhibits a positive but diminishing relationship with the number of insurers in the market. We also find positive relationships between median household income and the percentage of the population that is white. As expected, markets that are considered to be more urban also have larger numbers of insurers. We observe no systematic relationships between the gender distribution or educational attainment in the market and the number of firms. With respect to the provider supply factors, which are expected to influence insurers' input prices, our results suggest that a larger number of specialists per capita is positively associated with the number of insurers, but only at the $p<.10$ level in the baseline specification. Results from the additional specifications (columns 2-4) reveal that the patterns identified in the baseline specification are generally robust.

Using the baseline model estimates, we generated per-firm entry thresholds and ratios of entry thresholds (Table 3). Because all markets have at least one insurer, we are not able to identify the minimum population required for the first insurer to enter. Even for the second insurer, we estimate a very small minimum population threshold of 41 persons (the smallest market has two insurers). However, for larger numbers of insurers to enter, we see dramatic increases in the minimum population that would be needed to

support entry. Specifically, we find that it takes a minimum of 16,557 persons to induce the third firm to enter rising to and 242,000 per firm for the seventh insurer to enter the market.

Also reported in Table 3 is the set of entry threshold ratios, which exhibit a generally decreasing pattern with the number of firms (411.5 to 1.13). It is important to note that the difference in ratios across adjacent market structures are not statistically significant; although, the ratio for two entrants is significantly higher than the ratios for five or more entrants This pattern can be interpreted as competition becoming more intense as the number of firms increases. Of course, changes in entry threshold ratios by themselves cannot differentiate whether this is due to prices falling or costs increasing. We examine these issues next.

Premiums

Table 4 summarizes unadjusted average monthly premiums across all plan and metal types as well as average second lowest silver premiums by the number of participating insurers in the market. Average premiums for the second lowest silver product are inversely relate to the number of insurers, ranging from $239 in markets with one insurer to $193 for markets with seven firms.

We also examine premiums of different metal levels by number of insurers in the market. Average premiums are generally decreasing with the number of insurers and the rate of decrease appears to be proportional across metal levels as seen in Figure 2.

Results from the multivariate analysis of premiums on the number of insurers and other control variables are reported in Table 5. Our baseline model (column 1) tells a story

similar to the descriptive statistics, whereby for each additional insurer in the market, premiums decrease by $12.32 on average, *ceteris paribus*. Comparing the magnitude of this effect to the overall average premium of $266.20, suggests about a 5% decrease in premiums for each additional competitor in the market.

Relative to silver products (70% actuarial value), catastrophic products (60% actuarial value) are about $62 less expensive, while gold (80%) and platinum (90%) products are $48 and $61 more expensive, respectively. In addition, the estimates reveal that HMOs tend to cost, on average $50 more per month, even after controlling for actuarial value.

With respect to market characteristics, our results suggest that markets premiums tend to be lower in markets with higher percentages of white, males, and college-educated individuals, and higher in those with higher household income. Interestingly, we find very little evidence to suggest any association between provider supply and monthly premiums. This may result from the lack of detail regarding provider market structures.

Product attributes:

One concern identified in the conceptual framework is that product attributes (e.g., distribution of vertically differentiated product attributes, Z) might be changing with entry. To investigate this, we examined two outcomes – the share of products by metal level and the share of products by plan type (EPO, HMO, POS, PPO) – and the number of competing insurance plans. Our results (Table 4) reveal a very stable pattern of product distributions, whereby about 8% are catastrophic plans, 29% are bronze plans, 33% are silver, 25% are gold, and 5% are platinum; although, there is a small increase high-generosity plans in

larger markets. The distribution of plan types reveals slightly more variation, with PPOs more prevalent in markets with few insurers and EPOs and HMOs more common in markets with larger numbers of insurers. Overall, these results suggest that the entry threshold and price effects are not the result of changes in product attributes.

Insurer Costs:

One challenge of the Bresnahan and Reiss framework is that declining entry threshold ratios are consistent with price competition getting tougher. However, another explanation consistent with the pattern is that costs may be heterogeneous across firms such that more efficient firms are more likely to enter smaller, more concentrated markets. To explore this issue, we constructed a ratio of the average costs of participating insurers within each market to the average costs of all potential entrants (e.g., all health insurers within the state during 2012 who had been operating in the individual, group, FEHBP, or Medicaid segments). Figure 3 illustrates that this cost ratio exhibits an increasing pattern with the number of insurers in the market, consistent with the conjecture that entrants may be relatively more efficient than non-entrants particularly in more concentrated markets.

While this correlation is suggestive, multivariate estimates based on Equation 13 suggest a modest role for cost heterogeneity. On average, each additional entrant results in an average cost increase of 0.67% across all firms in the market. Thus the second entrant would be 0.67% more costly than the most efficient firm (i.e., the "first" entrant) while the fifth entrant would be about 4% less efficient.

Sensitivity Checks:

We explore a number of potential issues with our empirical strategy. First, the measurement of both market boundaries and sizes are potentially problematic. While the ACA restricts consumers to choosing products within their county of residence, the insurer's entry costs may depend on entry decisions within neighboring counties as well. We thus estimated entry models at the GRA level. Estimates were consistent with those reported in Table 3.

Second, market size and the role of demand shifters are particularly difficult to measure. For example, one might argue that the effective market size is not the entire non-elderly population but only the proportion that does not have employer group or public coverage (e.g., uninsured and those with individual coverage previously). We explored a variety of alternative population measures, such as the number of uninsured, and additional demand shifters. Results from these alternative specifications are consistent within those reported above.

Finally, insurers price their products based on demographic characteristics. While the results in Table 5 are based on prices for 27-year old non-smokers, we also examined prices for other consumers of other ages and tobacco status. The results were remarkably consistent across alternative price measures, as suggested by Figure 2.

Conclusions and Policy Implications

Our analyses of insurer entry into the Exchange-based individual market and the relationships of premiums and plan choices to entry reveal three key findings. First, results from the entry model suggest that competition becomes more intense as the number of insurers in the market increases. One might expect that increased transparency of product

choices in an online marketplace along with increased product standardization introduced by ACA regulations would lead to very competitive conduct with relatively few insurers. However, the pattern of entry thresholds suggests substantial gains from increased competition for markets with fewer than four entrants.

Second, our analyses of premiums reveal that each additional insurer in a market is associated with a reduction in the average monthly premium of the second lowest silver plan of about $12 or roughly five percent of baseline premiums for a 27 year old non-tobacco user. Very similar patterns are observed for consumers of different ages and tobacco status as well as premiums for plans having different metal levels. Our results align closely with the findings of Burke et al. (2014) and Dafny et al. (forthcoming), even though each study differed on dimensions relating to market definition (e.g., geographic rating area versus county), scope (e.g., all states versus FFM), and methods (e.g., OLS versus instrumental variables).

Third, our analyses of premiums and the distribution of product offerings illustrate that changes in average premiums across markets with differing numbers of insurers parallel findings for the second lowest silver plan, suggesting perhaps that insurers do not appear to responding to the fact that premium subsidies are tied to the silver metal level. Additionally, our results suggest that the proportion of products by metal level is very stable across markets with different numbers of insurers; although, there is a modest increase in the prevalence of more generous plans in larger markets. While the degree of consistency is not as strong for plan types, this likely is due to heterogeneity with respect

to the organization of providers in the delivery of care in smaller versus larger markets based on population.

Finally, we explore the role of insurer cost heterogeneity. The average incumbent Exchange entrant is approximately 15% more efficient than the average of all potential Exchange entrants that had been in operation in the state in 2012. We further find that the marginal entrant has nearly one percent higher average per capita operating costs than the preceding entrant. Of course, given our use of historical NAIC annual filings, we are unable to comment on non-incumbent entrants' efficiency.

Deviations from perfectly competitive conduct may occur as the result of a number of possible factors, two of which are cost heterogeneity and unobserved product differentiation. It is also possible that given the infancy of Exchanges, insurers and consumers are still learning, as their premiums were decided in advance of knowing competitor premiums. Analyses of outcomes in future years will be valuable for understanding how conduct changes as this market matures. Moreover, there is still much that we do not know regarding whether and to what extent the composition of insurer types (e.g., non-profit, CO-OP, or new entrants) matters for understanding competitive conduct.

Together, these study results suggest that having multiple insurers competing with one another in the Exchange-based individual market is critical for achieving the ACA's policy goal of enhancing consumers' access to affordable health plan choices. Future work is needed for understanding how entry and competition in Exchange-based markets is changing under these new rules of the game.

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Table 1: Market characteristics averages, overall and by number of insurance firms

	All	Number of Insurance Firms						
Characteristics	**Markets**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Population (age<65)	69790	33193	44018	49785	97575	159817	334556	832392
Male	0.499	0.498	0.502	0.500	0.497	0.494	0.496	0.490
Median Income	$43,037	$36,668	$42,779	$43,211	$48,143	$50,054	$49,793	$47,390
White	0.776	0.661	0.814	0.807	0.777	0.802	0.762	0.613
College educated	0.182	0.149	0.176	0.183	0.212	0.227	0.228	0.279
Beds per capita	0.003	0.003	0.003	0.003	0.002	0.002	0.003	0.002
PCPs per capita	0.0009	0.0007	0.0008	0.0008	0.0010	0.0013	0.0014	0.0018
OBGYNs per capita	0.00005	0.00005	0.00004	0.00004	0.00006	0.00008	0.00009	0.00012
Specialists per capita	0.00031	0.00026	0.00025	0.00027	0.00042	0.00054	0.00074	0.00090
Medicare expenditures per enrollee	$8,828	$9,200	$8,834	$8,493	$8,824	$9,008	$9,116	$10,270

Note: Market is defined at the county level. Data on number of insurers comes from Healthcare.gov QHP Landscape file. Population characteristics come from AHRF for year 2011-2012 and ACS 2012.

Table 2: Insurer entry models, estimated by Ordered Probit

Variabes	(1)	(2)	(3)	(4)
Population	2.14e-06***	2.30e-06***	-1.97e-05	2.48e-06***
	(4.19e-07)	(4.03e-07)	(1.36e-05)	(4.29e-07)
Population squared	-0***	-0***	-0***	-0***
	(0)	(0)	(0)	(0)
Proportion Male	0.837	0.898	0.134	0.704
	(1.422)	(1.411)	(1.509)	(1.406)
Income (median)	6.46e-05***	6.20e-05***	4.67e-05**	6.19e-05***
	(2.24e-05)	(2.15e-05)	(1.95e-05)	(2.13e-05)
Income squared	-4.21e-10**	-3.98e-10**	-2.15e-10	-4.12e-10**
	(2.12e-10)	(2.01e-10)	(1.66e-10)	(1.97e-10)
Proportion White	0.834***	0.770**	0.648*	0.761**
	(0.323)	(0.311)	(0.334)	(0.312)
Propoertion College Educated	0.00393	0.000363	0.00233	0.00187
	(0.00572)	(0.00580)	(0.00626)	(0.00599)
Hospital beds per cap.	5.379	6.107	8.242	-14.40
	(6.593)	(6.101)	(6.307)	(13.70)
PCPs per capita	-86.28	-101.3	-91.89	-25.34
	(64.81)	(63.58)	(69.47)	(85.03)
OBGYNs per capita	-710.2	-652.7	-842.2	-1,139
	(534.2)	(535.8)	(571.3)	(868.3)
Specialists per capita	185.4*	204.7**	246.9**	-24.25
	(104.7)	(100.8)	(99.57)	(186.5)
Urban influence code	0.0436**	0.0508**	0.0376*	0.0539**
	(0.0204)	(0.0203)	(0.0212)	(0.0211)
Medicare reimbursement per enrollee		-5.79e-05*	-7.06e-05**	-5.73e-05*
		(3.19e-05)	(3.27e-05)	(3.24e-05)
			Size interactions	Provider Poly
Cut1	2.383**	1.758	0.885	1.631
	(1.206)	(1.269)	(1.327)	(1.263)
Cut2	3.405***	2.783**	1.912	2.658**
	(1.189)	(1.251)	(1.309)	(1.246)
Cut3	4.297***	3.679***	2.815**	3.555***
	(1.174)	(1.233)	(1.289)	(1.228)
Cut4	4.981***	4.364***	3.511***	4.242***
	(1.172)	(1.230)	(1.290)	(1.225)
Cut5	5.504***	4.890***	4.050***	4.770***
	(1.172)	(1.230)	(1.291)	(1.225)
Cut6	6.211***	5.591***	4.794***	5.478***
	(1.170)	(1.234)	(1.301)	(1.229)
Observations	2,512	2,508	2,508	2,508

Robust standard errors in parentheses, clustered by rating area.
*** p<0.01, ** p<0.05, * p<0.1.

Table 3: Entry Thresholds and Entry Threshold Ratios

Entrants	2	3	4	5	6	7
Population per firm	41	16,667	125,000	170,000	191,667	242,857
S_{n+1}/S_n	411.5	7.5	1.36	1.13	1.27	.

Table 4: Plan Premiums and Costs

	Participating Insurance Firms						
	1	2	3	4	5	6	7
Unadjusted Premium	$ 261	$ 249	$ 266	$ 290	$ 294	$ 263	$ 248
Second-Lowest Silver Premium	$ 239	$ 222	$ 219	$ 212	$ 212	$ 200	$ 193
Share of plans in county by metal level							
Catastrophic	0.07	0.08	0.08	0.08	0.08	0.08	0.06
Bronze	0.29	0.29	0.30	0.29	0.29	0.25	0.27
Silver	0.34	0.33	0.32	0.33	0.34	0.35	0.34
Gold	0.26	0.26	0.25	0.26	0.25	0.26	0.26
Platinum	0.05	0.04	0.04	0.04	0.04	0.07	0.06
Share of plans in county by type of insurance product							
EPO	0.09	0.07	0.08	0.07	0.05	0.07	0.12
HMO	0.34	0.22	0.27	0.37	0.43	0.35	0.47
POS	0.03	0.07	0.11	0.11	0.14	0.11	0.01
PPO	0.54	0.64	0.54	0.45	0.38	0.48	0.39
Insurer cost structures							
Actual entrants	$ 301	$ 303	$ 292	$ 296	$ 302	$ 297	$ 347
Potential entrants	$ 440	$ 410	$ 395	$ 434	$ 453	$ 373	$ 414

Table 5: Monthly Premiums and Insurer Entry

VARIABLES	(1) base	(2) quadratic	(3) nonlin_1	(4) nonlin_2	(5) discrete
Insurer Competition					
N_hat	-12.32**	-8.085			
	(5.821)	(22.25)			
N_hat squared		-0.629			
		(2.838)			
1-2 Entrants			12.51		
			(10.83)		
3-5 Entrants				-17.01	
				(11.31)	
5-9 Entrants			-27.42	-42.68	
			(22.45)	(26.13)	
2 Entrants					4.740
					(14.45)
3 Entrants					-6.657
					(20.12)
4 Entrants					-28.19
					(23.55)
5 Entrants					-31.53*
					(16.65)
6 Entrants					-54.51*
					(32.65)
7 Entrants					-48.79*
					(26.99)
Plan characteristics					
EPO	7.918	7.742	7.385	7.907	8.016
	(7.210)	(7.369)	(7.255)	(7.007)	(7.354)
HMO	49.84***	49.81***	49.55***	49.86***	50.00***
	(16.66)	(16.72)	(16.69)	(16.75)	(16.79)
POS	2.692	2.603	3.057	3.084	2.680
	(7.441)	(7.515)	(7.516)	(7.379)	(7.556)
Catastrophic	-62.14***	-62.14***	-62.09***	-62.28***	-62.15***
	(11.49)	(11.48)	(11.49)	(11.41)	(11.47)
Bronze	-22.88**	-22.89**	-22.87**	-22.97**	-22.93**
	(9.323)	(9.327)	(9.322)	(9.274)	(9.289)
Gold	48.10***	48.10***	48.10***	48.01***	48.10***
	(1.391)	(1.390)	(1.384)	(1.352)	(1.389)
Platinum	61.14***	61.11***	60.99***	60.97***	61.10***
	(4.320)	(4.316)	(4.348)	(4.358)	(4.322)

Market characteristics					
Proportion Male	-217.5*	-216.4*	-217.0*	-227.1*	-221.8*
	(129.3)	(126.8)	(125.3)	(130.4)	(127.2)
Income (median)	0.00161**	0.00158***	0.00157***	0.00160**	0.00158***
	(0.000633)	(0.000561)	(0.000552)	(0.000678)	(0.000546)
Proportion White	-58.52**	-59.69**	-58.33**	-62.91**	-62.82**
	(26.00)	(27.78)	(26.41)	(26.69)	(29.65)
Proportion College	-0.997**	-0.988**	-1.172**	-1.061**	-0.948**
	(0.455)	(0.442)	(0.465)	(0.465)	(0.415)
Beds per capita	-166.6	-160.4	-137.0	-165.2	-169.1
	(559.7)	(548.1)	(546.3)	(577.7)	(546.9)
PCPs per capita	10,521	10,428	11,139	10,723	10,204
	(6,898)	(7,058)	(7,074)	(7,081)	(7,159)
OBGYNs per cap	-35,205	-35,419	-35,714	-34,294	-38,157
	(48,246)	(47,943)	(49,392)	(47,665)	(48,865)
Specialists per cap	6,375	6,542	4,522	5,316	7,215
	(13,207)	(13,255)	(13,040)	(13,483)	(13,437)
Medicare reimbursement per enrollee	-0.00962***	-0.00954***	-0.0101***	-0.00945***	-0.00945***
	(0.00290)	(0.00285)	(0.00297)	(0.00283)	(0.00280)
Constant	456.5***	450.9***	428.0***	437.5***	431.8***
	(92.48)	(88.90)	(90.02)	(87.89)	(84.13)
Observations	77,158	77,158	77,158	77,158	77,158
R-squared	0.069	0.069	0.068	0.068	0.069

Robust standard errors in parentheses, clustered by rating area

*** p<0.01, ** p<0.05, * p<0.1

Figure 1: Distribution of Counties by Number of Competing Insurers

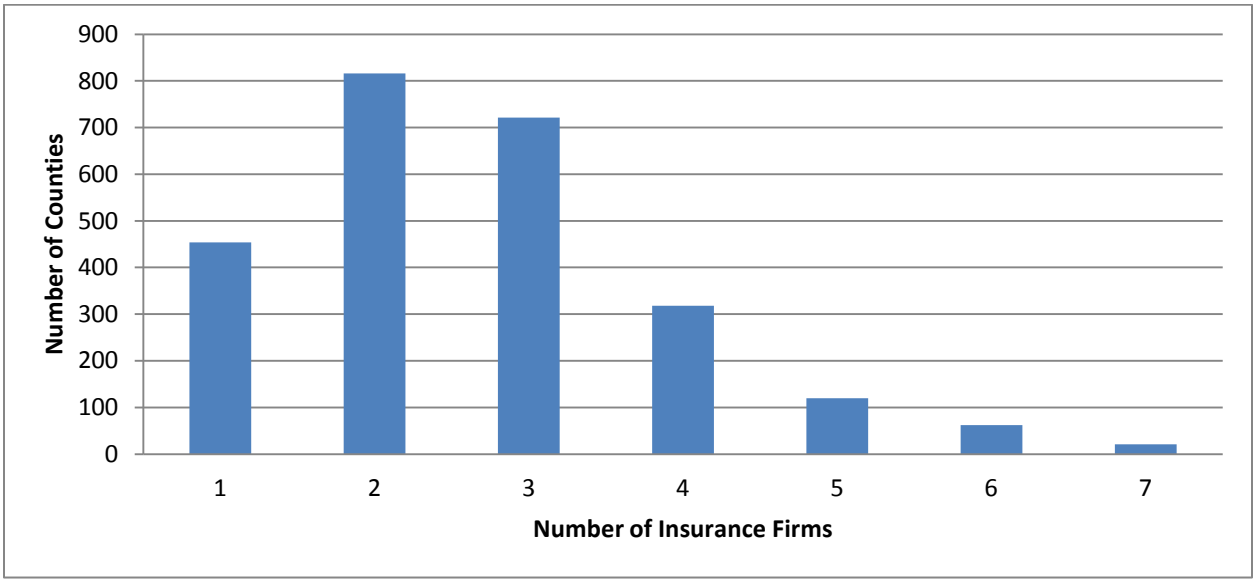

Figure 2: Median Premiums by Entry and Metal Level

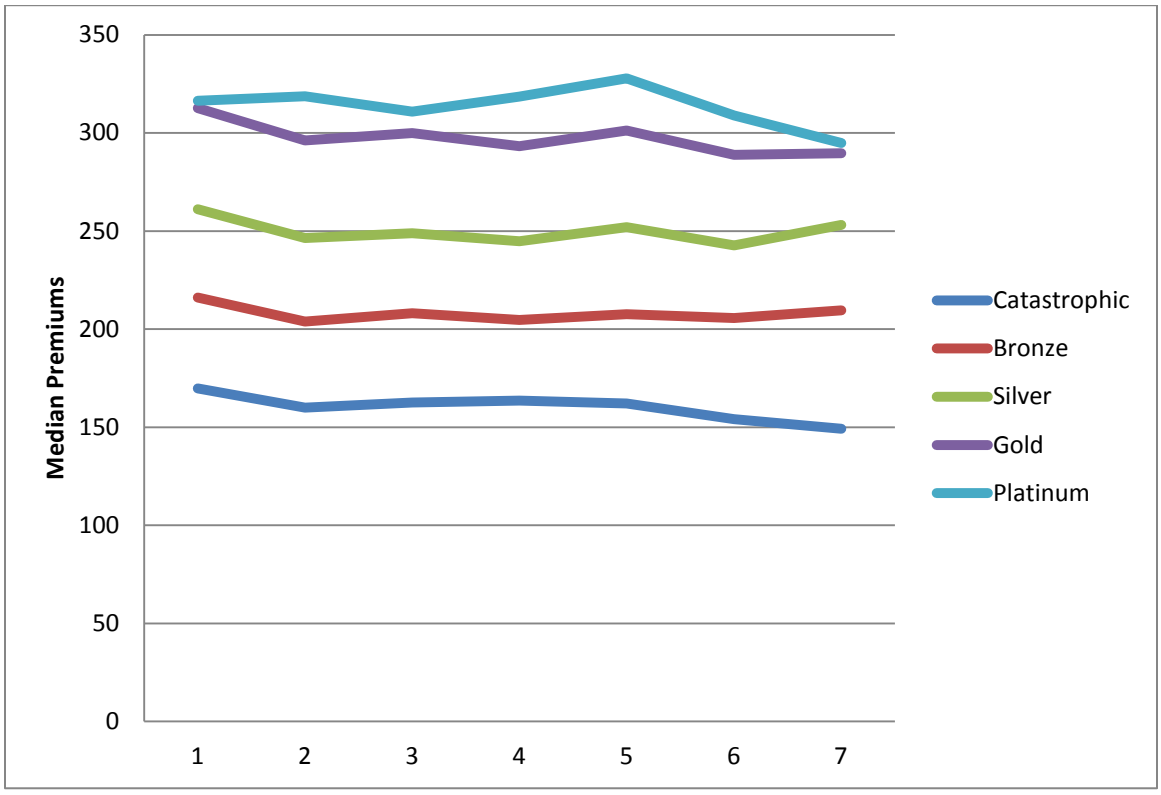

Figure 3: Ratio of exchange entrants costs to cost of state's potential entrants