Has Affordable Care Act Successfully Brought Down Individual Market Premiums in the United States?

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I. Introduction

On March 23, 2010, President Obama signed into law the Patient Protection and Affordable Care Act (ACA), the most comprehensive reform of the U.S. medical system in at least 45 years. The law had three primary goals: first, to provide more Americans with access to affordable health insurance; second, to increase the quality of health care utilized by Americans; and third, to reduce the cost of health care in the US.

The United States spends 17 percent of its GDP on health care, by far the most of any nation in the world (Gruber, 2011). Despite this high level of spending, 16.3 percent of the population or 49.9 million people had no insurance (DeNavas Walt, Proctor, and Smith 2011). The primary source of insurance coverage in the United States is employer-sponsored insurance (ESI), plus two major sources of public insurance coverage, Medicare and Medicaid programs, which aim to provide coverage for elderly and low income children. The only group of people left is the “working poor”, i.e. non-employer-sponsored people, who are only eligible for limited plans in individual insurance markets and usually with very high prices.

To reduce the increasing health expenditure and the high uninsured rate, a key mechanism of the ACA was the creation of health insurance exchanges (a.k.a. marketplaces) in each state. The exchanges allowed individuals to purchase coverage from participating providers with compensation or subsidies. Advocates of the ACA claimed that competition among providers within marketplaces and government subsidization of individuals’ premiums on plans purchased through exchanges would reduce the costs of non-group health insurance. With the activation of the exchanges in the fall of 2013, the question as to
how non-group health insurance premiums have changed after the implementation of ACA can now be empirically tested and measured.

This paper aims to answer the question: how have individual health insurance premiums changed since reforms created by the ACA? Section II reviews the existing literature on the effects of health reforms on premiums and the key determinants of health premiums. Section III demonstrates the conceptual models used in my study and Section IV presents summary statistics. Section V presents empirical results and robustness tests. Lastly, Section VI concludes and outlines areas for improvement in future research.

II. Literature Review

In general, non-group (individual) insurance plans are charged higher premiums than group participants. The primary reason for this is that group plans can pool risk, while individual plans are prone to adverse selection. Adverse selection leads to the least healthy wishing to buy insurance, while healthy people choose not to. Gruber (2011) noted that non-group insurance often featured “pre-existing conditions exclusions” that excluded from coverage any spending on illness that was present at the time of the insurance purchase. Dong (2013) found that health insurance providers in the individual market anticipate greater health care expenditures by the potential customers, therefore charging higher premiums. As a result, people participating in the individual market face significant financial risk from illness. To protect the rights of this group of people, the ACA legislated that insurance companies cannot refuse to cover people with pre-existing conditions. The rules went into effect for plan years beginning on or after January 1, 2014.
To understand the effect of the ACA on non-group health insurance, I review the existing literature pertaining to the effects of health care reform on premiums. Since the policy of health insurance exchanges is based on each state, there is no published literature that examines how national premiums have changed since the implementation of the exchanges. However, existing literature has reviewed the changes to premiums following Massachusetts’ 2006 health care reform, from which much of the ACA was modeled (Long, 2012). Using premium data from the Medical Expenditure Panel Survey - Insurance Component (MEPS-IC), Cogan et al. (2010) calculated the difference in percentage growth in premiums in Massachusetts between 2004-2006 (pre-reform) and 2006-2008 (post-reform) and compared this Massachusetts difference with a national average (excluding Massachusetts). They concluded that Massachusetts experienced six percent greater premium growth, relative to the rest of the United States, which had not implemented health care reform. Their study concluded that, contrary to its aim, Massachusetts’ health reform actually increased premiums, relative to the rest of the nation.

Gruber (2011), however, critiqued the results of Cogan et al., as their study only analyzed changes to employer-sponsored individual insurance premiums. That is, Cogan et al. (2010) ignored the primary target of Massachusetts’ health reform, which was the individual market. Blumberg et al. (2012) also concluded that employers were not likely to drop coverage for their employees under that act. Therefore, the employer-sponsored insurance premiums should not vary a lot.

Graves and Gruber (2012) corrected the shortcoming of the Cogan et al., study by calculating the change to non-group market premiums. Utilizing data from the MEPS-IC, Graves and Gruber (2012) conducted a study similar to that of Cogan et al., (2010). Graves
and Gruber (2012) used survey data from 2002-2006 (pre-reform) and 2006-2010 (post-reform) to calculate the difference between the Massachusetts and the national percentage growth in employer-sponsored individual premiums. With this expanded data set, Graves and Gruber (2012) found that Massachusetts’ post-reform premium growth was 8.7 percent less than the national growth in premiums. This difference, however, was not statistically significant. In addition to ESI premiums, using 2006 (pre-reform) and 2009 (post-reform) state-level non-group average annual premium data from the Association for Health Insurance Plans (AHIP), Graves and Gruber (2012) found that Massachusetts' percentage growth in non-group premium was 35 percent lower than that of national average. Unfortunately, the data from AHIP came without standard errors, so Graves and Gruber were unable to determine the statistical significance. Despite this limitation, Graves and Gruber (2012) found enormous reductions in post-reform non-group premium growth in Massachusetts, relative to the rest of the nation. The result was consistent with the goal of Massachusetts’ health reform.

In addition to literature reviewing Massachusetts’ health reform, literature exists to analyze key determinants of health insurance premiums. One determinant is the number of insurance firms that participate in exchanges. Using premium data from Healthcare.gov and enrollment data from the Center for Consumer Information and Insurance Oversight (CCIIO), Dafny et al., (2014) estimated the change in premiums if UnitedHealthcare had participated in the 34 federally-facilitated marketplaces (FFMs).¹ As the number of firms in a market increases, the premiums should decrease because the market becomes

¹A federally-facilitated marketplace (FFM) is one of four exchange types allowed under the ACA. According to KFF, in 2016 there are 13 State-based Marketplaces, 4 Federally-supported Marketplaces, 7 State-Partnership Marketplaces and 27 Federally-facilitated Marketplaces.
increasingly competitive. Had UnitedHealthcare participated in the FFMs, Dafny et al., (2014) found that nationwide premiums on second-lowest price silver plans\(^2\) would have decreased 5.4 percent on average. Similarly, if all private market insurers had participated in a state’s health insurance exchanges in 2011, premiums on second-lowest price silver plans sold in the exchanges would have decreased an average of 11.1 percent. These findings appear to be consistent with our microeconomic theory that, as the quantity of firms in a market increases, the market and collusive power possessed by firms decreases, and overall prices in the market decrease (Pindyck and Rubinfeld, 2005). Therefore, as the number of firms participating in an exchange increases, premiums on plans sold through the exchanges should decrease.

Another factor affecting insurance prices is a state’s decision to expand the Medicaid eligibility or not. Medicaid Expansion is one important component of the ACA that gives states the choice to expand Medicaid eligibility to citizens with incomes equal to or less than 133 percent of the federal poverty level. If a state does not expand Medicaid and one has been denied Medicaid coverage, the person is exempt from the mandate to obtain insurance and won’t owe the fee. Using pooled data from the Medical Expenditure Panel Survey-Household Component (MEPS-HC), Clemans-Cope et al., (2013) determined that annual out-of-pocket health care spending decreased by an average of $921 for qualifying Medicaid recipients with chronic health conditions in states that expanded Medicaid coverage. While ‘out-of-pocket’ health care spending is not exclusively spending on insurance premiums, a significant portion of out-of-pocket spending is directed towards

\(^2\)Plans in the Health Insurance Marketplace are presented in 4 "metal" categories: Bronze, Silver, Gold and Platinum. Literature focuses on the premiums associated with the second-lowest price silver plans sold in exchanges because federal insurance subsidy amounts are tied to the costs of these plans.
premiums (in addition to deductibles, copayments, etc.). Therefore, it is reasonable to deduce from the Clemans-Cope et al., (2013) study that, with other conditions remaining the same, premium levels should be lower in states that expanded Medicaid eligibility than in states that did not expand eligibility.

An additional determinant of premiums is the percentage of a population with insurance coverage. Using survey data from the 2006 and 2010 Massachusetts Health Reform Surveys, Long et al., (2012) calculated the difference in the percentage of the Massachusetts population with health insurance after reform. The post-reform difference, a 7.6 percent increase in coverage, was significant from the pre-reform coverage percentage at the one percent level. With this increased insurance coverage, Long et al., (2012) also found evidence of increased affordability of health care. Using data from the same Massachusetts Health Reform Surveys, they calculated that post-reform out-of-pocket health spending was 3.7 percent lower in Massachusetts relative to pre-reform. This percentage difference was also significant at the one percent level. Moreover, Gruber (2008) found a negative relationship between insurance costs and coverage. Although existing literature suggests that as the percentage of a population with insurance coverage increases, out-of-pocket health expenses, specifically premiums, should decrease, there are some potential problems within this relationship. First, it is necessary to recognize that out-of-pocket health expenses are not exclusively premiums. Second, the causality between coverage rate and premiums is still ambiguous. Decreases in health premiums will increase the amount of affordable insurance plans in the market and therefore the coverage rate will increase as well. Hence, it is possible to have endogeneity problem between premiums and coverage rate in the model.
III. Conceptual Model

i. Linear Regression Model

Starting with a simple linear regression model, I define the average premiums sold in exchange in each state, *Premium*, as a function of *NIssuers*, the quantity of providers participating in a individual health insurance marketplace and *Medicaid*, a dummy variable to indicate if a state has adopted the Medicaid Expansion or not. Since existing literature only demonstrates negative relationship between premiums and coverage rates without specifying the causality, I do not include coverage rates as an independent variable in my model to avoid potential problems such as endogeneity. In addition, I include two control variables, *Per Capita Personal Income (PCPI)* and *Total Population*, that might affect the premiums. Putting together these variables, my linear regression conceptual model is:

\[
PREMIUM_{it} = \beta_0 + \beta_1 NIissuers_{it} + \beta_2 Medicaid_{it} + \beta_3 PCPI_{i(t-1)} + \beta_4 Population_{i(t-1)} + \mu_{it}
\]

As suggested by theory and existing literature, the expected signs on the coefficients of *Number of Issuers* and *Medicaid Expansion* are negative. That is, as the number of issuers increases, holding other conditions constant, the premiums should decrease. Similarly, states that expand Medicaid eligibility ought to see a lower premium. I include *Per Capita Personal Income (PCPI)*, into the model to control for various income levels among states. If the average personal income in a state is higher, it is reasonable to have higher premiums in that state on average. I also include *Total Population* in the model for two reasons. On one hand, states with higher population should request more issuers participating in individual health insurance exchanges, therefore leading to lower premiums. On the other hand, if a state has higher population, the demand of individual health insurance plans is
higher, which will therefore raise the premiums. Hence, the overall effect of total population on the premiums in exchanges is ambiguous. Notice that *Per Capita Personal Income (PCPI)* and *Total Population* used in my conceptual model are from the previous year because the open enrollment period of this year starts from the last quarter of the previous year\(^3\).

**ii. Quadratic Regression Model**

In microeconomics, the law of diminishing returns states that in all productive processes, adding more of one input of production, while holding all others constant, will at some point yield lower incremental per-unit returns (Samuelson and Nordhaus, 2001). As we increase the number of issuers in marketplaces, the decrease in premiums will therefore be diminishing and at some point, the market will become inefficient. Based on the theory, I develop a quadratic regression model which includes an additional variable called *NSquared* that is the square of number of participants (*NIssuers*) in marketplaces. Therefore, my quadratic regression conceptual model is:

\[
PREMIUM_{it} = \beta_0 + \beta_1 NSquared + \beta_2 NIssuers_{it} + \beta_3 Medicaid_{it} + \\
+ \beta_4 PCPI_{i(t-1)} + \beta_5 Population_{i(t-1)} + \mu_{it}
\]

As suggested by theory, \(\beta_1\) should be positive to be in accord with the law of diminishing marginal returns. The expected signs of other variables should all be consistent with the ones in the linear regression model.

**IV. Ideal, Actual Data and Summary Statistics**

**i. Ideal Data and Measurement**

\(^3\) For example, the open enrollment period of 2016 marketplace plans was from Nov 1, 2015 to January 31, 2016.
As summarized in the literature in Section II, health reform is important to accommodate the cost of health care in the United States. Ideally, to investigate the effectiveness of the ACA on healthcare reform, I would find data to examine the hypothesis that healthcare cost is a function of health reform policies. In my project, I use health premiums in individual marketplaces to measure the cost of healthcare. It is, however, necessary to be aware that in addition to health insurance, cost on pharmacy and other professional services also accounts for a significant portion of expenditure on healthcare. I use the number of issuers participating in marketplaces as a proxy for competition in the market, and use Medicaid Expansion Decision as a proxy for government policy in the health reform. It is unlikely that additional competitors joining in the individual market will decrease the premiums proportionally. That is why the quadratic regression model is included as one of my conceptual models. Notice that I am not going to cover all the implementations under the ACA since this project specifically focuses on the establishment of health insurance exchanges.

ii. Actual Data and Summary Statistics

I use statewide data for Premiums, Number of Issuers and Medicaid Expansion Decision from 2014 to 2016, and statewide data for Per Capita Personal Income and Total Population from 2013 to 2015.

As a necessary proxy for individual market premiums in exchanges, I use statewide average monthly premium data on the second lowest price silver plans (SLPSP) for a 40-year-old non-smoker making $30,000/year sold in each state's exchange, given that SLPSP is the "benchmark" plan and federal insurance subsidy amounts are associated with the costs of these plans. The premium data include average monthly premiums for all fifty
states\(^4\) and District of Columbia, and range from $154 for Minnesota in 2014 to $719 for Alaska in 2016. \textit{NIssuers} is measured by the number of companies that are participating within a state marketplace. The data for \textit{NIssuers} range from 1 to 16 and the median number of issuers in a state is four\(^5\). \textit{Medicaid}, an indicator variable, is measured by states that expanded Medicaid eligibility (\textit{Medicaid}=1) and states that did not expand (\textit{Medicaid}=0). As of March 2016, 32 states have adopted the Medicaid Expansion (including DC). Data for \textit{Premiums}, \textit{NIssuers} and \textit{Medicaid} are all taken from Kaiser Family Foundation, a non-profit organization focusing on national health issues.

I take annual \textit{Per Capita Personal Income (PCPI)} and \textit{Total Population} data from 2013 to 2015 from Federal Reserve Economic Data (FRED). \textit{PCPI} range from $33,629 in Mississippi 2013 to $71,496 in DC 2015. As for \textit{Total Population}, Wyoming had the least, with 583,220 people in 2013 while California had the most, with 39,144,820 people in 2015. \textit{Table 1} provides summary statistics of all variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premiums</td>
<td>152</td>
<td>277.25</td>
<td>70.99</td>
<td>154</td>
<td>719</td>
</tr>
<tr>
<td>NIssuers</td>
<td>146</td>
<td>5.52</td>
<td>3.77</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Medicaid</td>
<td>153</td>
<td>0.559</td>
<td>0.498</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>PCPI</td>
<td>153</td>
<td>45505.88</td>
<td>7677</td>
<td>33629</td>
<td>71496</td>
</tr>
<tr>
<td>Population</td>
<td>153</td>
<td>6253.42</td>
<td>7078.78</td>
<td>583.22</td>
<td>39144.82</td>
</tr>
</tbody>
</table>

\(^4\) Massachusetts premium data of 2016 is not yet available.
\(^5\) \textit{NIssuers} data for California, Colorado, Idaho, Kentucky, Massachusetts, Minnesota and Rhode Island in 2016 are not yet available.
V. Analysis and Robustness Check

i. Analysis of Results

Using the data collected, I first examine the relationship between individual market premiums under ACA and the indicated independent variables by running a pooled Ordinary Least Squares (OLS) regression on my linear model. The result of estimates is presented in Table 2 as following.

|               | Coeff. | Std. Err. | t     | P>|t| |
|---------------|--------|-----------|-------|-----|
| NIssuers      | -3.395 | 1.504     | -2.26 | 0.026 |
| Medicaid      | -27.560| 12.103    | -2.28 | 0.024 |
| PCPI          | 0.003  | 0.001     | 3.89  | 0.000 |
| Population    | 0.002  | 0.001     | 1.98  | 0.049 |

Over the 146 observations from 50 states and DC from 2014 to 2016, the regression produces negative coefficients for NIssuers and Medicaid, and positive coefficients for PCPI and Population, all consistent with theory. As one additional issuer participates in a state marketplace, ceteris paribus, the premiums will decrease by $3.40. Similarly, states that expanded Medicaid eligibility should expect a decrease of $27.6 in premiums relative to those states that did not expand the eligibility. As a state’s average Per Capita Personal Income and Total Population increases, the individual market premiums increase as well. In addition, all of the four coefficients are statistically significant at 5 percent level. By looking at the residual-versus-NIssuers plot presented in Graph 1, I find that when NIssuers is
relatively small or relatively large, premiums are under predicted so that many of the residuals are positive.

Graph 1. Residual vs. NIssuers plot in Linear Regression Model

Then I incorporate \textit{NSquared} in my quadratic regression model, and the results are displayed in Table 3.

<table>
<thead>
<tr>
<th>Table 3. Estimates of Quadratic Regression Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Observations: 146</td>
</tr>
<tr>
<td>F (4, 140) = 11.48</td>
</tr>
<tr>
<td>Prob &gt; F: 0.000</td>
</tr>
<tr>
<td>R-squared = 0.2922</td>
</tr>
<tr>
<td>Adj R-squared = 0.2667</td>
</tr>
<tr>
<td>\textbf{Coeff.}</td>
</tr>
<tr>
<td>NSquared</td>
</tr>
<tr>
<td>NIssuers</td>
</tr>
<tr>
<td>Medicaid</td>
</tr>
<tr>
<td>PCPI</td>
</tr>
<tr>
<td>Population</td>
</tr>
</tbody>
</table>
Using the same dataset examined, the quadratic regression provides a stronger relationship between premiums and independent variables than that in the linear regression. First, the adjusted R-squared in quadratic regression model is 0.2667, much higher than 0.1206 in the linear model, showing that the quadratic relationship between premiums and number of issuers explains the variations in premiums better. The coefficient sign of NSquared is positive and the sign of NIssuers is negative, both significant at 1 percent level. Mathematically, it forms a concave-up parabola of premiums versus number of issuers. Therefore, I am able to find a number of issuers that gives a minimum premium cost. To see the relationship more clearly, I draw the relationship between premiums and number of issuers in Graph 2, holding PCPI and population constant at their means (of all states and years).

As observed in Graph 2, if we assume a state has expanded the Medicaid eligibility, the premiums will be $25 lower on average than if we do not. When there are on average eight or nine issuers participating in individual market exchanges, the market will be the
most efficient and the premiums charged by issuers are the lowest at around $250 if Medicaid eligibility has been expanded, or at around $225 if it has not been expanded yet.

**ii. Robustness Check**

To further test whether I should use the quadratic regression model or not, I use `lowess` in Stata to generate locally weighted scatter plot smoothing for *Premiums* and *Nissuers*. The graph is presented in **Graph 3**. As expected, instead of having a downward sloping line, I get a smoothing concave-up parabola. It confirms that the quadratic regression model will provide better estimations.

![Graph 3. lowess smoothing of Premiums vs. Nissuers](image.png)

I also look at the residual-versus-fitted plots of two models that are shown in **Graph 4**. Residuals in both models are random enough\(^6\) except two outliers appear at the upper-right corner. By looking at the data, point 1 represents the premium of Alaska in 2016 ($719) while point 2 represents the premium of Alaska in 2015 ($547). High claim costs and a relatively small market have been ongoing concerns in Alaska. One of the two

\(^6\) Therefore there is no serial correlation.
companies offering individual health insurance policies for Alaskans, Hoda Health, just announced on May 02, 2016 that it would not be participating in that market in 2017 (Miami Herald, 2016). Preliminary calculations by Hoda indicated that it would need a significant premium increase in 2017 to be sustainable on the individual market. To have long term sustainability in the market, instead of passing the costs on to consumers, governments, along with insurance providers and hospitals, still need to work hard and continue the conversations on future market reforms.

Moreover, I test if there exists multicollinearity within independent variables by calculating the pair-wise correlations shown in Table 4 in Appendix. The results suggest that there is no multicollinearity in both models. In addition, since the data tested in the project are only from three years, it is not necessary to use fixed-effect model or random-effect model of panel data. For the same reason, it is very likely that there is no heteroscedasticity or non-stationary problems which will significantly affect the results of this analysis.
VI. Conclusion

This paper sought to investigate how individual health insurance premiums have changed since reforms created by the ACA. The main findings can be summarized as follows. Both of the linear regression model and quadratic regression model suggest that as the number of issuers in a state’s health insurance exchange increases, as a state decides to expand Medicaid eligibility, individual market premiums in exchanges should decrease. As Per Capital Personal Income (PCPI) and Total Population in a state are higher, we can expect higher premiums in that state on average. The quadratic regression model also suggests that, holding PCPI and Total Population constant at means, if there are 8 or 9 issuers participating in a state’s marketplace, the lowest price of Silver Plans will be accessible to the consumers.

In addition to the announcement of quitting the Alaskan marketplace by Hoda Health, UnitedHealth Group Inc., the leader of U.S. health care industry, has also confirmed that it will exit marketplaces in at least 16 states (Bloomberg, 2016). Chief Executive Officer Stephen Hemsley said in April that the exchange markets are smaller and riskier than UnitedHealth expected. Therefore the company will end up participating in ACA plans in "only a handful of states" next year. According to my estimates, the increasing number of providers that are leaving the exchanges might result in significant changes of individual market premiums. For states with more than 9 providers currently participating in the marketplaces, the increasing number of providers leaving the exchanges will reduce the average individual market premiums; otherwise, it will increase the average individual market premiums if there are less than 8 providers in marketplaces.
There, however, do exist limitations on the examinations of premium changes in marketplaces. First, instead of using the total individual market premiums, the data used to measure individual market premiums in this paper is the average monthly premiums of the Second Lowest Price Silver Plans sold in exchanges. Ideal data for premiums might be found in the future. Second, states have some flexibility in designing their marketplaces under the act. Therefore, different policies might influence the premiums significantly. For example, New York chose to accept all insurers who seek to participate in exchanges, while California chose to select a limited number of insurers to sell coverage (NYT, 2016). This choice was critical because Covered California, the state's marketplace, used its leverage in selecting plans to keep initial premiums low, while New York did not. Hence, future study can be done by examining the premium changes focused on different types of marketplaces and various government policies.

To further improve the study, more and accurate data can be examined over an extended period of time. It is the hope that by taking more variations into account, we can better answer the question that whether the ACA has successfully accomplished one of its overall objectives -- bringing down the cost of health care in the United States.
Reference


Appendix

Table 3. Multicollinearity Test

<table>
<thead>
<tr>
<th></th>
<th>Premium</th>
<th>Population</th>
<th>PCPI</th>
<th>NIssuers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premium</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population</td>
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<td>1.0000</td>
<td></td>
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</tr>
<tr>
<td>PCPI</td>
<td>0.2346</td>
<td>11.069</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>NIssuers</td>
<td>-0.1832</td>
<td>0.0394</td>
<td>0.0313</td>
<td>1.0000</td>
</tr>
</tbody>
</table>