Session 72L, Learning from 3 Years of ACA Data

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SOA Presentation Disclaimer
Society of Actuaries - Session 72

Learning From 3 Years of ACA Data

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PRESENTED BY
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Al Bingham, FSA, MAAA
Learning From 3 Years of ACA Data

Agenda

- Background, data, methodology
- Lessons learned from 2014-2016 ACA Data
- Factors shaping future ACA Results
- Q&A
Background: Data to Insight

- The motivation for the study
- Two Key Ideas
Methodology
Risk Adjustment & Profitability

- Important for plans to analyze their data to uncover profitability drivers
- Different stories

**Reality:** 100 clinical categories, 5 metal tiers, 10 rating areas, 20 HIOS plan IDs, 25 demographic categories, 5 provider networks

Would create 13 million data slices
Three Years of ACA Data

- EDGE, Supplemental, CMS MLR
- Participation
Three Years of ACA Data

A High Level Look at the Individual Market

Covered Lives and Loss Ratio by Benefit Year

Market: Individual, c.LossRatio

- 98%
- 96%
- 94%
- 92%
- 90%

2014 2015 2016
Three Years of ACA Data

Evolution of Net Profitability in Individual Market
Three Years of ACA Data

Comparison of “Successful” to “Less Successful” plans

(A)

(B)

% of Premium

Increase Decrease Total

-4% 0% 6% 10% -13% -13%

-19% 0% 7% 8% -11% -16%

Prem-Claim RA Reinsurance CSR Admin NI

Prem-Claim RA Reinsurance CSR Admin NI

-6% -5% -10% -15% -20% -25%

-6% -5% -10% -15% -20% -25%
Three Years of ACA Data

![Net Income as % of Premium by Demographic Category - Individual](chart.png)
Three Years of ACA Data
Three Years of ACA Data

Net Income as % of Premium by Count of HCCs - Individual

- No HCCs
- 1 HCC
- 2 to 3 HCCs
- 4 to 6 HCCs
- 7 to 10 HCCs
- 11+ HCCs
Three Years of ACA Data

Net Income as % of Premium, by Cost Quartile & Market
### Three Years of ACA Data

Net Income as % of Premium, by Cost Quartile & Market

<table>
<thead>
<tr>
<th>Variable Value</th>
<th>Individual Market - BY2016</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average Net Income (PMPM, 1R)</td>
<td>WRI Distancing Measure</td>
</tr>
<tr>
<td>All</td>
<td>-$16.81</td>
<td>3.35</td>
</tr>
<tr>
<td>Claimants in 1st Quartile</td>
<td>$85.32</td>
<td>0.34</td>
</tr>
<tr>
<td>Claimants in 2nd Quartile</td>
<td>$96.94</td>
<td>0.43</td>
</tr>
<tr>
<td>Claimants in 3rd Quartile</td>
<td>$113.14</td>
<td>0.52</td>
</tr>
<tr>
<td>Claimants in 4th Quartile</td>
<td>-$424.50</td>
<td>1.67</td>
</tr>
<tr>
<td>Enrollees with $0 Paid Claim Cost</td>
<td>$55.66</td>
<td>0.39</td>
</tr>
</tbody>
</table>
Can we predict the 4th Quartile?

Predictive Modeling

- The 4th Quartile: Interesting or Important?

- Random Assignment

<table>
<thead>
<tr>
<th>Train Data</th>
<th>Actual</th>
<th></th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted</td>
<td>1</td>
<td>2</td>
<td></td>
<td>%</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>196,333</td>
<td>79%</td>
</tr>
<tr>
<td></td>
<td>154,187</td>
<td>42,146</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>42,146</td>
<td>11,521</td>
<td>53,667</td>
<td>21%</td>
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<tr>
<td>Total</td>
<td>196,333</td>
<td>53,667</td>
<td>250,000</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td></td>
<td></td>
<td>21%</td>
<td>21%</td>
</tr>
</tbody>
</table>
Can we predict the 4th Quartile?

Predictive Modeling

- **Age-Gender Model**

\[
\ln \left( \frac{p}{1-p} \right) = a + \sum_{i}^{\text{demo}} b_i x_i + e
\]

<table>
<thead>
<tr>
<th>Train Data</th>
<th>Actual</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Predicted</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>179,142</td>
<td>43,398</td>
</tr>
<tr>
<td>2</td>
<td>17,191</td>
<td>10,269</td>
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<tr>
<td>Total</td>
<td>196,333</td>
<td>53,667</td>
</tr>
<tr>
<td>%</td>
<td>79%</td>
<td>21%</td>
</tr>
</tbody>
</table>

ROC Curve for Model
Area Under the Curve = 0.6795
Can we predict the 4th Quartile?

Predictive Modeling

- Age-Gender
  + Last Year Status Model

\[
\ln \left( \frac{p}{1 - p} \right) = a + \sum_{i}^{\text{demo}} b_{i}x_{i} + \sum_{j}^{\text{prior}} b_{j}x_{j} + e
\]

<table>
<thead>
<tr>
<th>Train Data</th>
<th>Actual</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted</td>
<td>1</td>
<td>2</td>
<td>230,775</td>
<td>92%</td>
</tr>
<tr>
<td></td>
<td>189,402</td>
<td>41,373</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6,931</td>
<td>12,294</td>
<td>19,225</td>
<td>8%</td>
</tr>
<tr>
<td>Total</td>
<td>196,333</td>
<td>53,667</td>
<td>250,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>79%</td>
<td>21%</td>
<td>64%</td>
<td></td>
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</tbody>
</table>
Can we predict the 4th Quartile?

Predictive Modeling

- “Kitchen Sink” Model

<table>
<thead>
<tr>
<th>Train Data</th>
<th>Actual</th>
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<tbody>
<tr>
<td>Predicted</td>
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<tr>
<td>1</td>
<td>194,328</td>
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<tr>
<td>2</td>
<td>2,005</td>
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<tr>
<td>Total</td>
<td>196,333</td>
</tr>
<tr>
<td></td>
<td>79%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Data</th>
<th>Actual</th>
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<tbody>
<tr>
<td>Predicted</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>194,712</td>
</tr>
<tr>
<td>2</td>
<td>2,013</td>
</tr>
<tr>
<td>Total</td>
<td>196,725</td>
</tr>
<tr>
<td></td>
<td>79%</td>
</tr>
</tbody>
</table>

\[ \ln \left( \frac{p}{1-p} \right) = a + \sum_{i} b_{i}x_{i} + \sum_{j} b_{j}x_{j} + \sum_{k} b_{k}x_{k} + e \]
Three Years of ACA Data

Other Observations

- Pricing
- Contracting
- Specialty Rx
- Hierarchical Condition Categories
Three Years of ACA Data

The Importance of Data

- Complete Coding
- Profitability Analytics
- EDGE Data Review
Historic Data
Looks through history for chronic conditions
• Examples:
  ✓ Asthma
  ✓ Diabetes
  ✓ Multiple Sclerosis

Pharmacy Data
Drugs highly correlated with certain conditions
• Examples:
  ✓ ATRIPLA (HIV)
  ✓ Effexor (Depression)
  ✓ Sovaldi (Hepatitis)

Diagnosis Data
Highly correlated comorbidities & Dx codes missing from model
• Examples:
  ✓ 4101, AMI Anterior Wall NEC (not in ACA model)
  ✓ 2722, Hyperlipidemia (Diabetes comorbidity)

Procedure Data
Procedure codes common for certain conditions
• Examples:
  ✓ Chemo admin (Cancer)
  ✓ Nebulizer (Asthma/COPD)
  ✓ Renal dialysis status (ESRD)
Importance of Coding

- Assumptions:
  - All ACA-compliant “Silver” metal-level plan
  - $400 monthly premium per member
  - 200,000 member months
  - 20% market share
  - Average PLRS of 1.00 vs. Market PLRS of 1.25

- Results
  - One member, one HCC (HCC006 / Opportunistic Infections) found & documented
  - Change in transfer: approx. $30,000
  - Another member, one HCC (G01 / Diabetes) found & documented
  - Change in transfer: approx. $3,600
Transfers can be high even for one person

More math...

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premium PMPM</td>
<td>$400.00</td>
</tr>
<tr>
<td>State Member Months</td>
<td>12</td>
</tr>
<tr>
<td>RA Transfer</td>
<td>$655,381</td>
</tr>
</tbody>
</table>

HHS Transfer formula: 

\[ T_i = \left( \frac{\sum_i (s_i \times PLRS_i \times IDF_i \times GCF_i)}{\sum_i (s_i \times PLRS_i \times IDF_i \times GCF_i)} \right) - \left( \frac{\sum_i (s_i \times AV_i \times ARF_i \times IDF_i \times GCF_i)}{\sum_i (s_i \times AV_i \times ARF_i \times IDF_i \times GCF_i)} \right) \bar{p} \]

- PLRS
- IDF
- GCF
- AV
- ARF
- FIRS
- FERS

* Has protein-calorie malnutrition (HCC23); Liver transplant status / complications (HCC34); Major depressive and bipolar disorders (HCC88); Respiratory dependence (HCC125); Congestive heart failure (HCC130); Heart infection (HCC135); Major congenital heart (HCC138); Specified heart arrhythmias (HCC142); Fibrosis of lung (HCC162); End stage renal (184); Artificial openings for feeding (HCC253); Diabetes (G01); Mucopolysaccharidosis (G02A); Disorders of immune (G08); Drug psychosis (G09)

Fictitious data, similar to real-world examples.
Risk Adjustment Under ACA
The Importance of Data

- Variation in coding completeness…
## Risk Adjustment Under ACA

### The Importance of Data

- **BY2016: Supplemental Diagnoses**

#### Top 10 HCCs found (by Weight)

<table>
<thead>
<tr>
<th>HCC</th>
<th>HCC_Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCC125</td>
<td>Respirator Dependence/Tracheostomy Status</td>
</tr>
<tr>
<td>G15</td>
<td>Chronic Obstructive Pulmonary Disease, Including Bronchiectasis, Asthma</td>
</tr>
<tr>
<td>HCC008</td>
<td>Metastatic Cancer</td>
</tr>
<tr>
<td>HCC253</td>
<td>Artificial Openings for Feeding or Elimination</td>
</tr>
<tr>
<td>HCC130</td>
<td>Congestive Heart Failure</td>
</tr>
<tr>
<td>HCC056</td>
<td>Rheumatoid Arthritis and Specified Autoimmune Disorders</td>
</tr>
<tr>
<td>G01</td>
<td>Diabetes with Acute Complications, Diabetes with Chronic Complications, Diabetes without Complication</td>
</tr>
<tr>
<td>HCC251</td>
<td>Stem Cell, Including Bone Marrow, Transplant Status/Complications</td>
</tr>
<tr>
<td>HCC142</td>
<td>Specified Heart Arrhythmias</td>
</tr>
<tr>
<td>HCC088</td>
<td>Major Depressive and Bipolar Disorders</td>
</tr>
</tbody>
</table>

#### Top 10 HCCs Deleted (by Weight)

<table>
<thead>
<tr>
<th>HCC</th>
<th>HCC_Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G13</td>
<td>Respiratory Arrest, Cardio-Respiratory Failure and Shock, Including Respiratory Distress Syndromes</td>
</tr>
<tr>
<td>HCC008</td>
<td>Metastatic Cancer</td>
</tr>
<tr>
<td>HCC009</td>
<td>Lung, Brain, and Other Severe Cancers, Including Pediatric Acute Lymphoid Leukemia</td>
</tr>
<tr>
<td>HCC011</td>
<td>Colorectal, Breast (Age &lt; 50), Kidney, and Other Cancers</td>
</tr>
<tr>
<td>HCC012</td>
<td>Breast (Age 50+) and Prostate Cancer, Benign/Uncertain Brain Tumors, and Other Cancers and Tumors</td>
</tr>
<tr>
<td>HCC023</td>
<td>Protein-Calorie Malnutrition</td>
</tr>
<tr>
<td>INT_GROUP_H</td>
<td>Interaction Group High</td>
</tr>
<tr>
<td>HCC131</td>
<td>Acute Myocardial Infarction</td>
</tr>
<tr>
<td>HCC184</td>
<td>End Stage Renal Disease</td>
</tr>
<tr>
<td>HCC142</td>
<td>Specified Heart Arrhythmias</td>
</tr>
</tbody>
</table>
Risk Adjustment Under ACA

Bonus Topic (time permitting): Measuring Performance

- A focus on member-level accuracy

Mehmud, S., Yi, R., Uncertainty in Risk Adjustment; Society of Actuaries, 2012

Mehmud, S., Non-Traditional Variables in Risk Adjustment; Society of Actuaries, 2013
Items Impacting Future ACA Results
Items Impacting Future ACA Results

- Child Rating Factors
- CSR Defunding
- ACA Risk Adjustment Changes
- 1332 Waivers
- Elimination of Individual Mandate Penalty
- Non-ACA Plans
# Child Rating Factors

## Federal Age Curve Child Rating Factors

<table>
<thead>
<tr>
<th>Age</th>
<th>Prior</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-14</td>
<td>0.635</td>
<td>0.756</td>
</tr>
<tr>
<td>15</td>
<td>0.635</td>
<td>0.833</td>
</tr>
<tr>
<td>16</td>
<td>0.635</td>
<td>0.859</td>
</tr>
<tr>
<td>17</td>
<td>0.635</td>
<td>0.885</td>
</tr>
<tr>
<td>18</td>
<td>0.635</td>
<td>0.913</td>
</tr>
<tr>
<td>19</td>
<td>0.635</td>
<td>0.941</td>
</tr>
<tr>
<td>20</td>
<td>0.635</td>
<td>0.970</td>
</tr>
<tr>
<td>21</td>
<td>1.000</td>
<td>1.000</td>
</tr>
</tbody>
</table>
CSR Defunding

- Premium Impact
  - Varied by State
  - Majority of issuers increased Silver plan premiums

- Enrollment Impact
  - More eligible for subsidies
  - Higher subsidy amounts (and increased Federal spending)
  - Free or inexpensive Bronze, and less expensive Gold plans

- No change to Risk Adjustment treatment of CSR enrollees
Risk Adjustment Changes

- Changing Risk Adjustment makes it difficult to measure actual morbidity change over time
  - 2017 - Duration Factors
  - 2018 - Reduce state average premium by 14%
  - 2018 – Incorporate prescription drugs (condition and severity)
  - 2018 - Large claims pooling
  - 2019 – Use of actual ACA data (blended) to develop RA coefficients
- Changes in risk adjustment transfers will directly impact WRI financial performance measures.
Market Risk Changes 2016 and 2017

- Average market risk scores increased 4% and 3% on average for the individual and small group markets respectively
- Individual 4% increase would have been higher if not for metal buy-downs
- Increase was predominantly driven by an increase in the average number of coded HCCs
- Demographic risk stayed relatively stable
- Bronze off-exchange experienced a large increase in coded HCCs

Evan Morgan, Chia Yi Chin, Ross Winkelman, Tylor Steiner, “Comparison of Nationwide 2016 and 2017 ACA Markets,” Wakely Consulting Group, January, 2018
Market Risk Changes 2017 and 2018

- 2018 total risk scores decreased by roughly 5% to 7% when compared to 2017.
- The decrease is attributable to decrease in both demographic and condition risk score components.
1332 Waivers

- Requirements
- Claims-based reinsurance
- Condition-based reinsurance
Elimination of Individual Mandate Penalty

- Likely ACA enrollment declines especially for unsubsidized younger and healthier enrollees
- Increased ACA premiums
- Increased subsidies and Federal spending
- Impact will vary by state
  - Market characteristics
  - State regulatory actions
- Risk Adjustment doesn’t make up for overall market selection
Non-ACA Plans

- Short Term Limited Duration Plans
- Association Health Plans
- State-based Plans (e.g. Iowa)
- Impact on ACA Enrollment, Premiums, and Subsidies
Risk Adjustment in a Changing Market

- High risk pools and condition-based reinsurance
  - Risk adjustment is still necessary
  - Results from Wakely study
- Market bi-furcation without risk adjustment generally leads to higher ACA premiums, but how to actually risk adjust is a challenge
Learning from 3 Years of ACA Data

Q&A

For any follow up questions:

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