Screening in Contract Design: Evidence from the ACA Health Insurance Exchanges

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Introduction

Motivation

Tension between consumer choice, nondiscrimination, and selection

- In Exchanges (and privatized Medicaid and Medicare), insurers must:
  1. Enroll anyone who wants to join a plan
  2. Not tie premiums to health status (think pre-existing conditions)
Tension between consumer choice, nondiscrimination, and selection

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- These regulations enforce “fairness” and provide protection against long-term risk (Handel, Hendel, Whinston, 2015)

- But open the door for inefficiencies related to selection
  - Health insurance contracts have many dimensions to cream-skim; price is just one screen
Tension between consumer choice, nondiscrimination, and selection

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- But open the door for inefficiencies related to selection
  - Health insurance contracts have many dimensions to cream-skim; price is just one screen

- Risk adjustment is widely used to address this cream skimming problem - Removes the financial incentive to avoid costly patients
Despite RA, Concerns about Screening in Exchanges

Thinking here about selection influencing not risk pool, but plan design

HIV Patients Accuse Health Plans of Using Drug Costs to Discriminate

by John Tozzi
from Bloomberg Businessweek

Health care law did not end discrimination against those with pre-existing conditions

By Kay Tillow

LIFE

Health Insurers Discriminate Against Patients who Need Specialty Drugs?

By ED SILVERMAN
Feb 24, 2015 9:06 am ET

In a final rule issued last week concerning health benefits provided by the Affordable Care Act, the federal government noted that some health insurers are using “potentially discriminatory practices” against people with certain illnesses. As a result, they are paying more for their medications.
Despite RA, Concerns about Screening in Exchanges

- Even in the absence of direct discrimination via premiums or coverage denials, possibility of dissuading consumers from joining plans via benefit design.

- Anecdotes point to limiting access to entire classes of drugs as a backdoor discrimination. (Undoes intended protections for pre-existing conditions.)

- In November 2015, the National Multiple Sclerosis Society filed a comment with HHS’s Office for Civil Rights explaining that “common health insurance practices that can discriminate against people with MS are formularies that place all covered therapies in specialty tiers.”

- Separately, HHS has noted that one method indicating discrimination is to place “most or all drugs that treat a specific condition on the highest cost tiers.”
Drug Tiering in Exchanges/Marketplaces

- We study selection-related formulary design in 2015 in the ACA Exchanges
- Investigate whether drugs treating chronic conditions are a plausible screen
  - Prices are relatively transparent
  - Patient needs are predictable, and coverage may be salient at enrollment
Drug Tiering in Exchanges/Marketplaces

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- First, examine whether there is scope for selection: Does drug use predict profits net of risk adjustment? (Yes)
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- First, examine whether there is scope for selection: Does drug use predict profits net of risk adjustment? (Yes)
- Second, ask: Do formularies of Exchange plans track the incentive (Yes, with significant sophistication)
Adverse Selection and Contract Design in the Literature

- Lots of attention in the empirical literature to adverse selection in a fixed contracts setting (Einav, Finkelstein, and Cullen 2010)
  - Only contract prices respond to the enrollment pool
  - Doesn’t connect to concerns about poor coverage for certain services
  - Also doesn’t connect to the wide use of risk adjustment by regulators
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- Less empirical work on how the set of contracts offered in equilibrium is affected by selection patterns in a market
  - Despite lengthy and deep theoretical literature on the topic (Rothschild and Stiglitz 1976; Glazer and McGuire 2000; Veiga and Weyl 2016; Azevedo and Gottlieb 2017)

- Important to understand how contracts are used as screening devices
  - Important for evaluating the effectiveness of risk adjustment policies
  - We add here to findings in Medicare and pre-ACA individual markets by Carey (2017a,b), Decarolis and Guglielmo (2017), Lavetti and Simon (2016), Shepard (2016)
Part 1: How Well is Payment System Performing in Neutralizing Screening Incentives?
2 broad categories of regulations aimed to curb design for selection

1. Coverage mandates
   - EHB require Marketplace plans to cover at least one drug in each USP therapeutic category and class
   - No requirement about how drugs should be tiered within a class
2 broad categories of regulations aimed to curb design for selection

1. Coverage mandates
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   - No requirement about how drugs should be tiered within a class

2. Payment adjustments: Intended to align profit maximizing contracts with socially efficient contracts
   - Risk adjustment
   - Reinsurance
Selection Incentive - Data

- Marketscan administrative health insurance claims data (mostly self-insured employers) for about 12M people
- For each individual we observe
  - Demographics
  - Total spending
  - Prescription drug claims
  - All diagnoses appearing in claims
- Use HHS formulas/software to simulate person-specific plan revenues
  - Premiums
  - Risk adjustment transfer
  - Reinsurance
- Note that this is not Exchange data: Instead, we use it to produce out-of-sample predictions of which drugs insurers are incentivized to ration due to selection
Part 1: Incentives

Selection Incentive - Simulating Revenue

- Patient-specific costs, $C_i$ are the sum of all claims in the year
  For each $i$, sum all spending (not just drug costs, not just related costs)

- Patient-specific revenues, $R_i$, are:
  \[
  \text{actuarially fair premium} + \text{implied RA} + \text{implied reinsurance}
  \]
  \[
  \text{avg costs in sample} + f(\text{diagnoses, demographics}) + f(\text{realized costs})
  \]

- This gives person-level profitability. Next aggregate up to means among groups who consume each drug.
We group into standard therapeutic classes using REDBOOK e.g., *Anticoagulants* (blood thinners), *Antihyperlipidemicians* (statins); *Oral Contraceptives; Antidiabetic Agents, Insulins*

- 220 mutually exclusive drug classes $c$

Goal is to avoid conflating screening with steering patients to lower cost alternatives among classes of substitutes.

- From patient-specific costs, $C_i$, and revenues, $R_i$, calculate means $\overline{C_c}$ and $\overline{R_c}$ among consumers who fill a prescription for a drug in class $c$
Fact 1: For most classes, selection incentives neutralized
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- For most classes, selection incentives neutralized

- Vasodilating agents (treat angina)

- \(~$24,000\) in costs

- \(~$26,000\) in revenue = 

- \$4,200\) in premiums, 

- \$17,878\) in RA, and

- \$3,680\) in reinsurance
Fact 2: For some outliers, drug consumption signal of profitability

\[ \text{Average Revenue by Group} \]

\[ \text{Average Cost by Group} \]

- Biological response modifiers (treat multiple sclerosis, others)
- \(~\$61,000\) in costs
- \(~\$47,000\) in revenue =
- \$4,200\) in premiums,
- \$34,420\) in RA, and
- \$8,648\) in reinsurance
Fact 3: No overall correlation between profitability and cost

- No correlation between cost and implied profit
- Implies RA + Reinsurance succeed in decoupling profitability from patient costs on avg
- Implies that if plan designs track these incentives, some sophistication on part of insurers
## Part 1: Incentives

### Selection Incentives - Top Drug Classes

Here limiting to classes with > 0.01% takeup

<table>
<thead>
<tr>
<th>Class</th>
<th>Most Used Drug in Class</th>
<th>Conditions Treated by Most Used Drug</th>
<th>Net Loss: Cost - Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
</tbody>
</table>

### Largest Incentives to Avoid

- **Gonadotropins, NEC**
  - Most Used Drug: Ovidrel
  - Conditions: infertility in women
  - Net Loss: $15,326

- **Biological Response Modifiers**
  - Most Used Drug: Copaxone
  - Conditions: relapsing multiple sclerosis
  - Net Loss: $13,977

- **Opiate Antagonists, NEC**
  - Most Used Drug: naltrexone
  - Conditions: substance abuse disorders
  - Net Loss: $5,977

- **Ovulation Stimulants, NEC**
  - Most Used Drug: clomiphene citrate
  - Conditions: infertility in women
  - Net Loss: $5,304

- **Pituitary Hormones, NEC**
  - Most Used Drug: desmopressin
  - Conditions: diabetes insip., hemophilia A
  - Net Loss: $4,633

- **Vitamin A and Derivatives, NEC**
  - Most Used Drug: Claravis
  - Conditions: severe nodular acne
  - Net Loss: $4,428

- **Analg/Antipyr, Opiate Agonists**
  - Most Used Drug: hydrocodone-acetamin.
  - Conditions: moderate to severe pain; nerve pain; fibromyalgia;
  - Net Loss: $3,001

- **CNS Agents, Misc.**
  - Most Used Drug: Lyrica
  - Conditions: seizure
  - Net Loss: $2,965

- **Mydriatics EENT, NEC**
  - Most Used Drug: atropine
  - Conditions: poisonings; pre-surgical preparations
  - Net Loss: $2,877

- **Androgens and Comb, NEC**
  - Most Used Drug: AndroGel
  - Conditions: low testosterone
  - Net Loss: $2,688
### Largest Incentives to Attract

<table>
<thead>
<tr>
<th>Drug Class</th>
<th>Most Used Drug</th>
<th>Conditions Treated by Most Used Drug</th>
<th>Net Loss: Cost - Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antineoplastic Agents, NEC</td>
<td>methotrexate sodium</td>
<td>various cancers; various autoimmune diseases</td>
<td>$2,885</td>
</tr>
<tr>
<td>Multivit Prep, Multivit Plain</td>
<td>Folbic</td>
<td>vitamin deficiency</td>
<td>$3,058</td>
</tr>
<tr>
<td>Coag/Anticoag, Anticoagulants</td>
<td>warfarin</td>
<td>blood clots; stroke prevention</td>
<td>$4,328</td>
</tr>
<tr>
<td>Cholelitholytic Agents, NEC</td>
<td>ursodiol</td>
<td>primary biliary cirrhosis; gallstones</td>
<td>$4,751</td>
</tr>
<tr>
<td>Diuretics, Loop Diuretics</td>
<td>furosemide</td>
<td>edema due to heart, liver, kidney disease; high blood pressure</td>
<td>$5,813</td>
</tr>
<tr>
<td>Ammonia Detoxicants, NEC</td>
<td>lactulose</td>
<td>complications of liver disease; seiziures; heart arrhythmias; neuropathic pain</td>
<td>$7,181</td>
</tr>
<tr>
<td>Anticonv, Hydantoin Derivative</td>
<td>phenytoin sodium ext.</td>
<td>heart arrhythmias</td>
<td>$7,275</td>
</tr>
<tr>
<td>Cardiac, Antiarrhythmic Agents</td>
<td>amiodarone</td>
<td>chronic pancreatitis; cystic fibrosis; pancreatic cancer</td>
<td>$7,942</td>
</tr>
<tr>
<td>Digestants and Comb, NEC</td>
<td>Creon</td>
<td>heart arrhythmias; heart failure</td>
<td>$12,350</td>
</tr>
<tr>
<td>Cardiac, Cardiac Glycosides</td>
<td>Digox</td>
<td></td>
<td>$12,857</td>
</tr>
</tbody>
</table>
Possible technological change in the intervening period between calibration and now (Carey 2016)

HHS-HCC system based on Medicare Advantage’s CMS-HCC system; in fact, does a good job compensating diabetes and heart disease.

More generally, no reason to believe that predictors (drug utilization) that were not included in the RA algorithm are orthogonal to profitability
Fact 4: Reinsurance affects predictable profitability

For the low cost groups (triangles on left) there is a small increase in profitability.

For the high cost groups (red lines on right) there is a large decrease in profitability.
Part 2: Does Formulary Design Track the Incentive?
Data

- **Question:** Are drugs that predict unprofitable patients covered ungenerously?
  - If an unprofitable group of consumers uses a cheap drug, an insurer will want to inefficiently distort coverage to be poor for that cheap drug.

- **Unit of analysis:** drug class \( \times \) plan, because class captures the set of substitutable therapies.

- **We require data on formulary restrictiveness by drug class**
  - Formulary tiering for the universe of state and federal exchanges in 2015 from MMIT.
Restrictiveness - Measure

- To measure restrictiveness we use harmonized tiers
  1. Generic Preferred
  2. Generic
  3. Preferred
  4. Covered/ Non-preferred Brand
  5. Specialty
  6. Not listed
  7. Medical
  8. Prior authorization/Step therapy
  9. Not covered

- We draw a line below “covered” and call tiers below the line “restrictive” and tiers above the line “non-restrictive”

- For each REDBOOK drug class, we define formulary restrictiveness as the % of drugs in the class on a restrictive tier
Fact 5: HIX Formularies More Restrictive on Price and Non-Price

Figure: Frequency of Assignment to Restrictive Tier
Fact 5: HIX Formularies More Restrictive on Price and Non-Price

Figure: Frequency of Non-price Hurdles to Access
Fact 5: Drug Predicting Unprofitable Patients Are Restricted

<table>
<thead>
<tr>
<th>Fraction Specialty, PA/ST, or Not Covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug class with no incentive to avoid patient (10th percentile)</td>
</tr>
<tr>
<td>Employer</td>
</tr>
</tbody>
</table>

0% 10% 20% 30% 40% 50% 60% 70% 80%
Semiparametric Results

Grouping classes into 20 ventile bins by unprofitability.
Main result: Selection incentive predicts restrictive tiering

\[ Y_{jc} = \beta[HIX_j \times S_c] + \gamma_c + \alpha_j + \epsilon_{cj} \]

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>Selection Incentive Variable:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fraction of Class Tiered Specialty or Higher</td>
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<tr>
<td>Exchange X Selection incentive</td>
<td>(1)</td>
</tr>
<tr>
<td>Ratio (Cost/Revenue)</td>
<td>0.046***</td>
</tr>
<tr>
<td>(Cost - Revenue)</td>
<td>(0.014)</td>
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<tr>
<td>Therapeutic class FE</td>
<td>X</td>
</tr>
<tr>
<td>Plan FE</td>
<td>X</td>
</tr>
<tr>
<td>Therapeutic classes</td>
<td>220</td>
</tr>
<tr>
<td>Observations (plan X state X class)</td>
<td>858,440</td>
</tr>
</tbody>
</table>

- Regressor of interest normalized into standard deviation
- 1 std dev increase in selection incentive corresponds to 4.5 pct pt increase in drugs in restrictive tiers
Main Results: Summary

- Both cost-sharing and utilization management are apparent margins of distortion
  - Non-cost sharing hurdles to drug access matter too
  - Utilization management may plausibly be a response to CSR
  - CSR reduces insurers ability to steer patients (efficiently) and to screen via copays/coinsurance (inefficiently)

- Alternative parameterizations tell same story

- Even after controlling for a linear relationship between $S_c$ and restrictiveness:
  - Drugs in the top ventile bin face an additional 69 percent probability of being placed on a restrictive tier, compared to employer plans
  - Implies potential difference of thousands of dollars in OOP costs
    - e.g. Capaxone costs $4,000, so 25% coinsurance is order of magnitude larger than $100 copay
  - These same eleven classes face 1.8X probability of being dropped from GLP (Various)
Insurer Sophistication
Fact 6: Drugs are a small share of spending even among groups whose drug use flags them as unprofitable. Indicates sophistication.
What Are Insurers Responding To? Not Costs.

Already controlling for drug class FE\'s, but perhaps HIX plans are *differentially* attentive to high cost consumers...

Look within vertical slices: Equally costly but differentially profitable

Indicates sophistication
What Are Insurers Responding To? Net Profitability

Already controlling for drug class FEs, but perhaps HIX plans are differently attentive to high cost consumers...
Part 2: Formularies

What Are Insurers Responding To? Net Profitability

Already controlling for drug class FEs, but perhaps HIX plans are \textit{differentially} attentive to high cost consumers...

\begin{tabular}{lccccccc}
\hline
Selection Incentive Variable: & \textbf{Panel A} & & & & & & \\
& \textbf{Implied Profits and Total Costs Horserace} & & & & & & \\
& \textbf{Ellis-McGuire} & & & & & & \\
& \textbf{Ellis-McGuire} & & & & & & \\
& \textbf{Ratio} & \textbf{Diff.} & \textbf{Ratio} & \textbf{Diff.} & \textbf{Ratio} & \textbf{Diff.} & \textbf{Ratio} & \textbf{Diff.} & \textbf{Ratio} & \textbf{Diff.} & \textbf{Ratio} & \textbf{Diff.} & \textbf{Ratio} & \textbf{Diff.} \\
\hline
Exchange X Selection incentive & 0.051*** & 0.049*** & 0.041*** & 0.062*** & 0.064*** & 0.051*** & & & & & & & & \\
& (0.015) & (0.016) & (0.013) & (0.017) & (0.018) & (0.016) & & & & & & & & \\
Exchange X Average total cost associated with class & 0.042*** & 0.042*** & 0.041*** & & & & & & & & & & & \\
& (0.011) & (0.014) & (0.009) & & & & & & & & & & \\
Exchange X [Indicators for 20 total cost bins] & X & X & X & X & X & X & X & & & & & & & & \\
Therapeutic class FEs & X & X & X & X & X & X & X & & & & & & & & \\
Plan FEs & X & X & X & & & & & & & & & & & & \\
Observations (plan X state X class) & 858,440 & 858,440 & 858,440 & 858,440 & 858,440 & 858,440 & 858,440 & & & & & & & & \\
\hline
\end{tabular}

\[ Y_{jc} = \beta [S_c \times HIX_j] + \delta [Cost_c \times HIX_j] + \gamma_c + \alpha_j + \epsilon_{cj} \]
### What Are Insurers Responding To? Net Profitability

Everything in a horserace...

#### Panel C

<table>
<thead>
<tr>
<th></th>
<th>Ratio</th>
<th>Diff.</th>
<th>Ellis-McGuire</th>
<th>Ratio</th>
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<th>Ellis-McGuire</th>
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<td>Exchange X Selection incentive</td>
<td>0.045***</td>
<td>0.049**</td>
<td>0.049**</td>
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<td>Exchange X Average total cost associated with class</td>
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<td>0.042*</td>
<td>0.039</td>
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<td>(0.013)</td>
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<td>(0.029)</td>
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<td>Exchange X Average drug-only cost associated with class</td>
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<td>0.001</td>
<td>-0.003</td>
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<tr>
<td>Observations (plan X state X class)</td>
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<td>858,440</td>
<td>858,440</td>
<td>858,440</td>
<td>858,440</td>
<td>858,440</td>
</tr>
</tbody>
</table>
Ruling Out Other Explanations
Alternative Hypotheses

Recall that all regressions include drug class FEs, so any alternative hypothesis needs to generate *differential* incentives for HIX and ESI plans

1. Just incentivizing substitution to cheaper drugs? No.
2. Just about nudging toward generics? No.
   - A generic that predicts an expensive patient will face step therapy, utilization review, or exclusion from formulary
3. Incentivizing substitution to drugs with lower negotiated prices?
   - Include interaction between HIX and PBM-by-state fixed effects (compare Optum Rx Marketplace plans in Texas to Optum Rx ESI plans in Texas): Results unchanged
4. Moral hazard? No
   - No correlation between selection incentive measures and elasticity estimates from Einav, Finkelstein, Polyakova (2016) Elasticities vs Selection Incentive
   - Include interaction between HIX and elasticity estimates: Results unchanged
Just incentivizing substitution to cheaper drugs? No.

<table>
<thead>
<tr>
<th>Panel B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Within-Class Subsample:</strong></td>
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<tr>
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<tr>
<td><strong>Selection Incentive Variable:</strong></td>
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<tr>
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<tr>
<td>Exchange X Selection incentive</td>
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<tr>
<td>Therapeutic class FEs</td>
</tr>
<tr>
<td>Plan FEs</td>
</tr>
<tr>
<td>Therapeutic classes</td>
</tr>
<tr>
<td>Observations (plan X state X class)</td>
</tr>
</tbody>
</table>

- Here dependent variable includes only cheapest drugs within class
- This is not about efficiently steering consumers to low cost substitutes
Part 2: Formularies

Just about nudging toward generics? No.

<table>
<thead>
<tr>
<th>Within-Class Subsample:</th>
<th>Panel B</th>
<th></th>
<th></th>
<th>Ellis-McGuire Measure</th>
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</thead>
<tbody>
<tr>
<td>Selection Incentive Variable:</td>
<td>Generic Drugs Only</td>
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<td>Ratio (Cost/Revenue)</td>
<td>Difference (Cost - Revenue)</td>
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<td>Exchange X Selection incentive</td>
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<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
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<tr>
<td></td>
<td>0.040***</td>
<td>0.029*</td>
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<td>0.024</td>
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<tr>
<td>Plan FEs</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Therapeutic classes</td>
<td>192</td>
<td>192</td>
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</tr>
<tr>
<td>Observations (plan X state X class)</td>
<td>749,184</td>
<td>749,184</td>
<td>749,184</td>
<td></td>
</tr>
</tbody>
</table>

Here dependent variable includes only the generic drugs within each class

A few classes dropped because no generics

This is not about efficiently steering consumers to generic substitutes
### Part 2: Formularies

#### Just Different PBMs with Different Upstream Prices? No.

<table>
<thead>
<tr>
<th>Selection Incentive Variable:</th>
<th>Ratio 1</th>
<th>E-M 1</th>
<th>Ratio 2</th>
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- *e.g.*, Optum Rx Marketplace plans in Texas to Optum Rx ESI plans in Texas in cols 3 and 4

\[
Y_{jc} = \beta [S_c \times HIX_j] + \sum \delta_k [S_c \times PBM_k] + \gamma_c + \alpha_j + \epsilon_{cj}
\]
Concluding Observations

1. Risk adjustment + reinsurance do a good job overall in neutralizing screening incentives. *But some very unprofitable outliers exist.*

2. Reinsurance important in reducing the incentive to avoid high-cost types

3. This is not about plans nudging consumers to lower cost or generic options

4. Both cost-sharing and utilization management are margins of distortion

5. It is not high drug costs that determine high cost sharing. It is drugs that are unprofitable, net of RA/Reinsurance. We see plans making it hard/expensive to access even cheap drugs.

6. EHB cannot solve this problem. Too many hard to measure and hard to regulate plan features (prior-authorization, requirement to use in-house mail-in pharmacy)

7. Problems may be solveable with fairly minor reforms
   - Incorporating diagnoses X drug utilization into RA scheme; currently considered
APPENDIX
Fact 1: For most classes, selection incentives neutralized.
Fact 1: For most classes, selection incentives neutralized

Average Revenue by Group

Average Cost by Group

GLP (Various)  Screening in Exchanges  2017 Micro FTC
Fact 3: No overall correlation between profitability and cost.
Fact 3: No overall correlation between profitability and cost

![Graph showing the relationship between average cost by group and implied profit. The graph indicates a lack of correlation between these two variables.](image)
Most classes are clustered very near neutral

Ratio Measure

Mean: 1.16 Q1: .92 Median: 1.1 Q3: 1.25

Ellis-McGuire Measure

Mean: .05 Q1: -.05 Median: .07 Q3: .22
Residuals: Difference Measure

Residuals from $Y_{jc} = \gamma_c + \alpha_j + \epsilon_{cj}$

Grouping classes into 20 bins by selection incentive (Difference).
Residuals: Ratio Measure

Residuals from $Y_{jc} = \gamma_c + \alpha_j + \epsilon_{cj}$

Grouping classes into 20 bins by selection incentive (Ratio).

![Graph showing the distribution of residuals across different bins of selection incentive. The graph includes data points for employer plans and exchange plans, with fitted lines for each category. The x-axis represents the ventiles of selection incentive, while the y-axis shows the percent on restrictive tier, adjusted.]
Non-cost sharing hurdles to drug access matter too

\[ Y_{jc} = \beta [S_{mc} \times HIX_j] + \gamma_c + \alpha_j + \epsilon_{cj} \]
### Main Result: Non-linear Version

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Main Result: Plots

- Mean adjusted exchange-employer difference vs. Mean of selection incentive
- Various plots with different scales and ranges for the x and y axes.
Moral Hazard? We recode data to be matchable to Einav, Finkelstein, and Polyakova (2016)
Moral Hazard? No: Selection Incentive Uncorrelated with Elasticity