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

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Tension between consumer choice, nondiscrimination, and selection

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    1. Enroll anyone who wants to join a plan
    2. Not tie premiums to health status (think pre-existing conditions)

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  - Easy to keep out an expensive patient by offering poor coverage for the docs, hospitals, and drugs expensive patients seek

- Risk adjustment is widely used to address this cream skimming problem - Removes the financial incentive to avoid costly patients

Background: Risk Adjustment and Reinsurance

- Risk adjustment attempts to make all enrollees appear equally profitable to insurers
    - Regulator enforces *ex-post* budget neutral transfers from plans with low average risk scores to plans with high average risk scores
    - Eliminates the financial incentive to attract healthy enrollees
   - Each enrollee assigned a "risk score" based on set of 100-ish condition categories

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  - In first year, plans reimbursed for 100% of individual-level costs between $45,000 and $250,000
  - In later years, policy is less generous

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- Coverage mandates in part aim at this issue, but likely to be ineffective (more later)

Context: Risk Adjustment Central in Privately-Provided Insurance
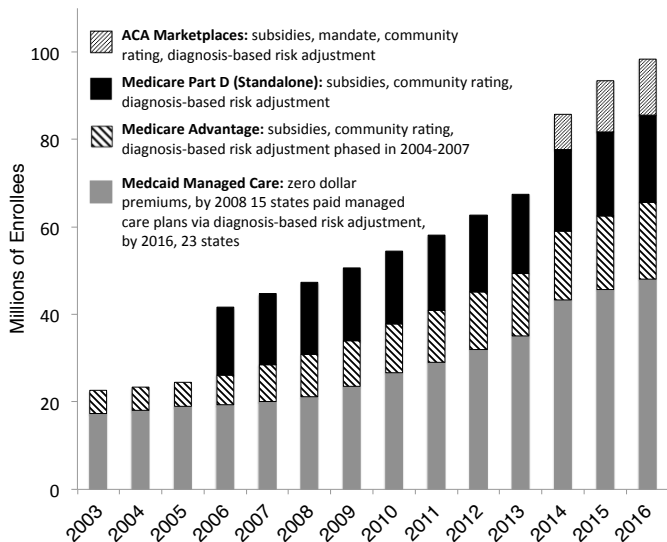
Despite RA, Concerns about Screening in Exchanges

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

Why would this be the case?

The important question is whether some patient types are predictably unprofitable, even after potentially large risk adjustment and reinsurance payments. Hypothetical:

Patient Taking: *Vasodilating Agent* (Angina /Chest Pain)	
Premium	$4,000
Risk Adjustment Payment	$18,078
Reinsurance Payment	$3,680
Expected Cost of Providing Care	-$24,129
Expected Profit	$1,629
No Incentive to avoid	

Patient Taking: *Opiate Antagnoist* (Addiction)	
Premium	$4,000
Risk Adjustment Payment	$10,366
Reinsurance Payment	$3,296
Expected Cost of Providing Care	-$23,639
Expected Profit	-$5,977
Large Incentive to avoid	

Both patients are expensive, but what matters is the net
Plans will try to design benefits to avoid the unprofitable

How Screening Plays Out Via Formularies 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.)

- 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."

Our Study: 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

1. Examine whether there is scope for selection: Does drug use predict profits net of risk adjustment? (Yes)

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2. Then, ask: Do formularies of Exchange plans track the incentive (Yes, with significant sophistication)

3. Discuss implications. (Removing ACA reinsurance and risk adjustment likely to make matters much worse for the sick.)
   - Much of what we say is relevant for privatized Medicare and privatized Medicaid

Part 1: How Well is Payment System Performing
in Neutralizing Screening Incentives?

Are there profits to be made by contorting plan benefits to attract and
avoid certain patients?

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

Selection Incentive - Simulating Revenue

- Patient-specific costs are the sum of all claims in the year

  for each person, sum *all* spending (not just drugs, not just related costs)

- Patient-specific revenues are:

$$\underbrace{\text{actuarial community premium}}_{\text{avg costs in sample}} + \underbrace{\text{implied RA}}_{\text{diagnoses, demographics}} + \underbrace{\text{implied reinsurance}}_{\text{based on realized costs}}$$

- Revenue minus costs gives person-level profitability. Next aggregate up to means among groups who consume each drug.

Selection Incentive - Aggregating up to Therapeutic Classes

- We group into standard therapeutic classes
  e.g., *Anticoagulants* (blood thinners), *Antihyperlipidemics* (statins);
  Oral Contraceptives; *Antidiabetic Agents, Insulins*

- 220 mutually exclusive drug classes *c*

- Simply plot costs versus revenue by patient group

Fact 1: For most classes, selection incentives neutralized
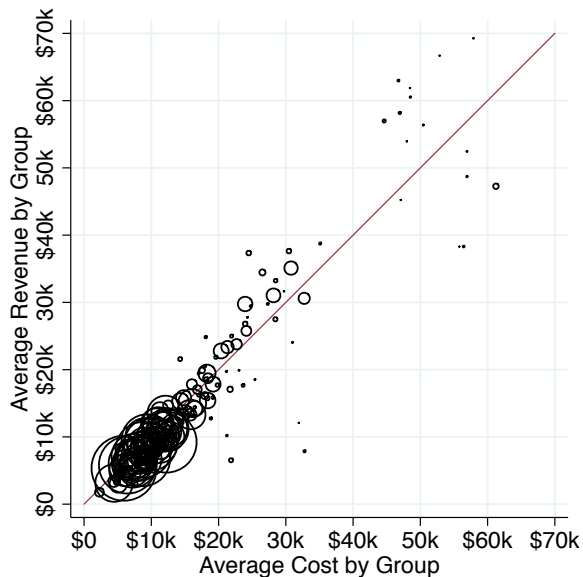
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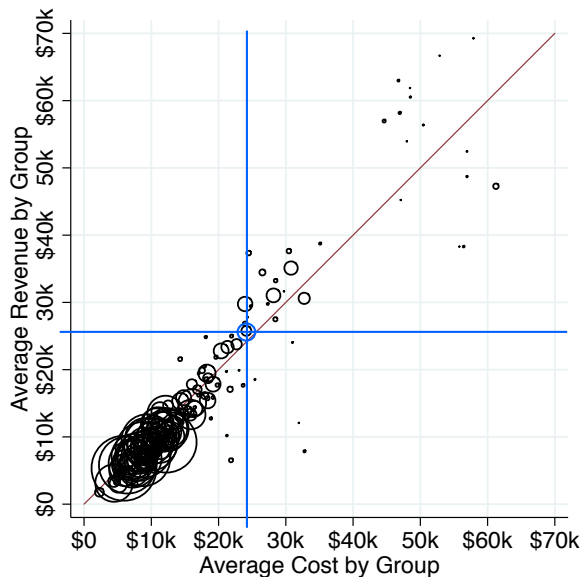
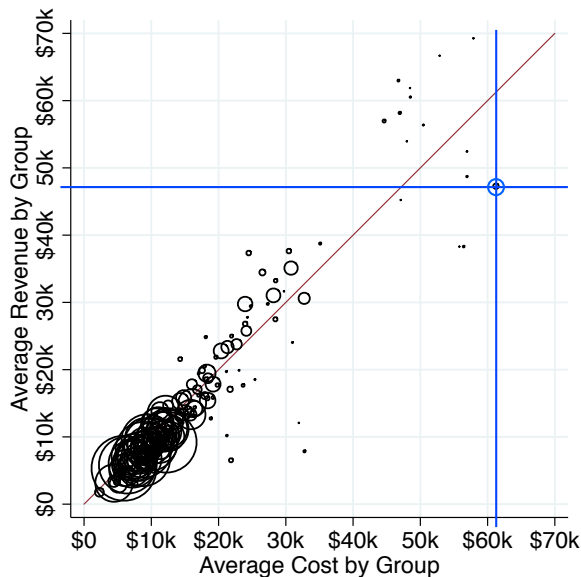*vasodilating agents*
(treat angina)

~$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

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

Selection Incentives - Top Drug Classes

Here limiting to classes with $> 0.01\%$ takeup

| Class	Most Used Drug in Class	Conditions Treated by Most Used Drug	Net Loss: Cost - Revenue
(1)	(2)	(3)	(4)
Largest Incentives to Avoid			
Gonadotropins, NEC	Ovidrel	infertility in women	$15,326
Biological Response Modifiers	Copaxone	relapsing multiple sclerosis	$13,977
Opiate Antagonists, NEC	naltrexone	substance abuse disorders	$5,977
Ovulation Stimulants, NEC	clomiphene citrate	infertility in women	$5,304
Pituitary Hormones, NEC	desmopressin	diabetes insip., hemophilia A	$4,633
Vitamin A and Derivatives, NEC	Claravis	severe nodular acne	$4,428
Analg/Antipyr, Opiate Agonists	hydrocodone-acetamin.	moderate to severe pain	$3,001
CNS Agents, Misc.	Lyrica	nerve pain; fibromyalgia; seizure	$2,965
Mydriatics EENT, NEC	atropine	poisonings; pre-surgical preparations	$2,877
Androgens and Comb, NEC	AndroGel	low testosterone	$2,688

Selection Incentives - Top Drug Classes

Largest Incentives to Attract

Antineoplastic Agents, NEC	methotrexate sodium	various cancers; various autoimmune diseases	-$2,885
Multivit Prep, Multivit Plain	Folbic	vitamin deficiency	-$3,058
Coag/Anticoag, Anticoagulants	warfarin	blood clots; stroke prevention	-$4,328
Cholelitholytic Agents, NEC	ursodiol	primary biliary cirrhosis; gallstones	-$4,751
Diuretics, Loop Diuretics	furosemide	edema due to heart, liver, kidney disease; high blood pressure	-$5,813
Ammonia Detoxicants, NEC	lactulose	complications of liver disease	-$7,181
Anticonv, Hydantoin Derivative	phenytoin sodium ext.	seziures; heart arrhythmias; neuropathic pain	-$7,275
Cardiac, Antiarrhythmic Agents	amiodarone	heart arrhythmias	-$7,942
Digestants and Comb, NEC	Creon	chronic pancreatitis; cystic fibrosis; pancreatic cancer	-$12,350
Cardiac, Cardiac Glycosides	Digox	heart arrhythmias; heart failure	-$12,857

Fact 3: No overall correlation between profitability and cost. Just mean zero errors.
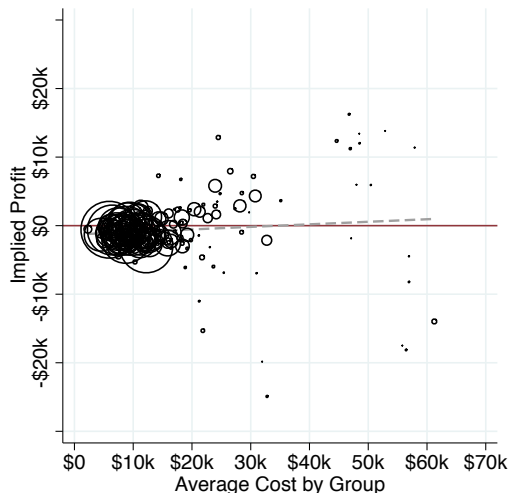
- No correlation btwn cost and implied profit
- Implies RA + Reinsurance succeed in decoupling profitability from patient costs on avg
- Implies that if plan designs track these incentives, some sophistication on part of insurers

▶ zoom in   ▶ zoom out

Why the 'Errors' in the Payment System?

- 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

Part 2: Does Formulary Design Track the Incentive?

In other words, does it matter that risk adjustment is imperfect? Do plans exploit this?
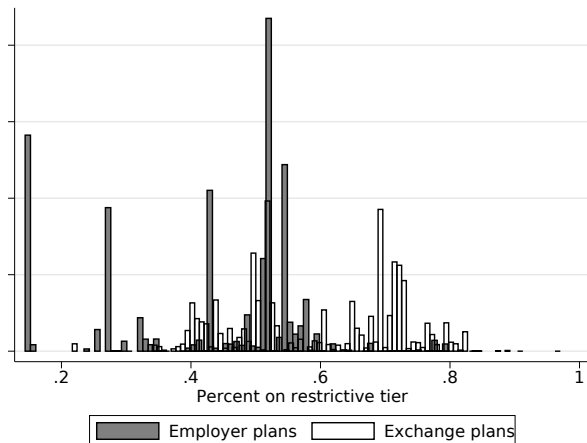
Data

- 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 4: HIX Formularies More Restrictive on Price and Non-Price

Figure: Frequency of Assignment to Restrictive Tier

Percent on restrictive tier

Employer plans   Exchange plans

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Figure: Frequency of Non-price Hurdles to Access: Step Therapy, Prior Auth.
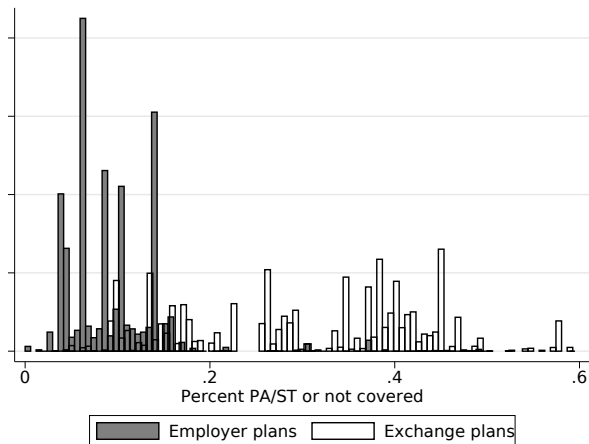
Do selection motivations influence plan design?

- Here we combine the data on:
  - which kinds of patients are profitable and unprofitable (left)
  - which drugs are less generously covered within a plan (right)
- And examine the degree to which these correlate
- As we do, we will account for the overall lower generosity within Exchange plans.
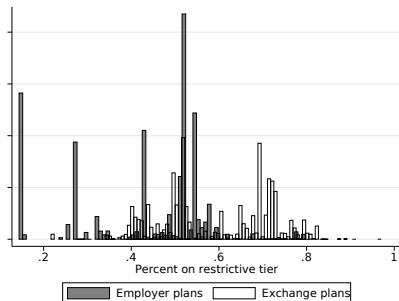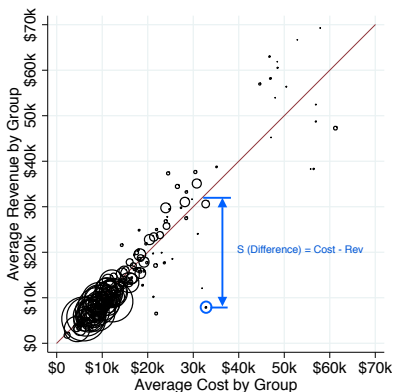
How to control for other factors influencing plan design?

- Key identification problem: Drugs used by unprofitable groups may differ on dimensions other than the selection incentive
    - E.g., insurers may restrict access to drugs simply because the drugs are low value relative to cost.
- Insight: Employer plans (ESI) don't get to select enrollees
  And ESI plans are not subject to the risk adjustment scheme

- We can use employer plan formularies to control for all drug class characteristics that are fixed across markets

Fact 5: Drug Predicting Unprofitable Patients Are Restricted

Grouping classes into 20 ventile bins by unprofitability. ▶ back
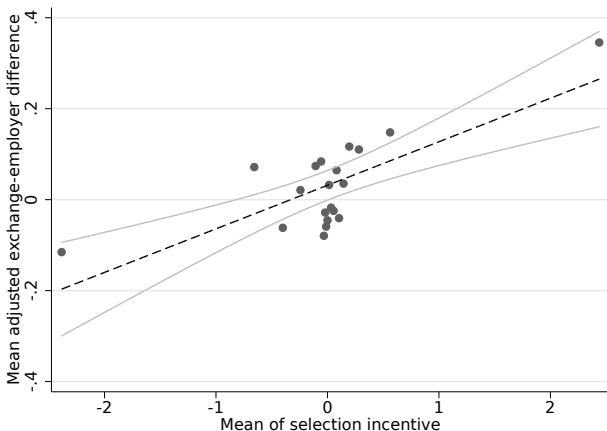
Consumers more unprofitable from left to right.

Insurers make coverage less generous (more restrictive) from bottom to top.

Fact 5: Drug Predicting Unprofitable Patients Are Restricted
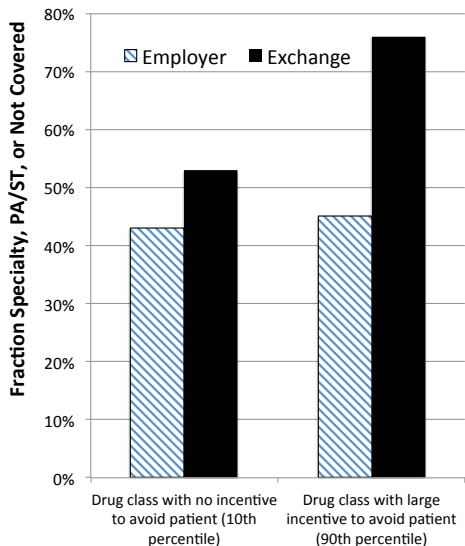
- 20 percentage point difference in probability of restrictive formulary tier in Exchange plans

- As expected, employer coverage is unrelated to ACA risk adjustment "errors".

  This makes clear that there isn't a confounding factor relating patient type and coverage generosity.

- The difference in coverage among Exchange plans is consistent with insurers perceiving the implied profits and attempting to avoid certain patients ▶ More

Main Results: Summary

- Both cost-sharing and utilization management are apparent margins of distortion

  - Non-cost sharing hurdles to drug access matter too ▸ Other Hurdles
  - 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 ▸ Non-linear Results ▸ Non-linear Plots

- How big are the effects? Difficult to summarize, but for some people large

  - Drugs in top 5% of selection incentive 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% (=$1,000) coinsurance is order of magnitude larger than $100 copay
  - Same eleven classes face 1.8X probability of being dropped or UM

What Are Insurers Responding To? Not Merely Costs.
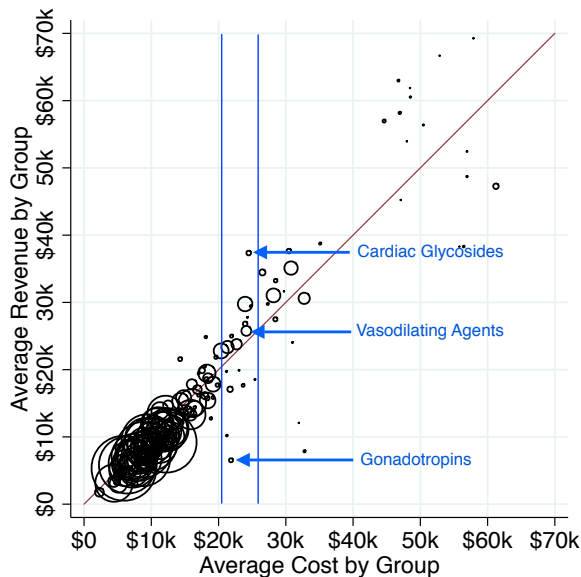
Already controlling for drug class FEs, so controlling for drug class-related cost. But perhaps HIX plans are *differentially* attentive to high cost consumers...

Look within vertical slices to condition on consumers that are equally costly but differentially profitable

Differentially restricting access for equally costly types

Ruling Out Other Explanations

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. Pushing substitution to drugs with lower negotiated prices? No.
   - 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. Addressing consumer 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

Summary of Findings

1. Risk adjustment + reinsurance do a good job overall in neutralizing screening incentives.

2. But some very unprofitable outliers exist. Plans are sophisticated in recognizing which types are unprofitable and responding

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

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

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

Some Implications for Policy

1. EHB (aka "coverage mandates") 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)

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4. Insurance mandate and cost sharing reduction subsidies are largely unconnected to the issues here

5. Key takeaway: ACA's introduction of risk adjustment and reinsurance dampen insurers' incentive to avoid sick patients, but where they don't do so perfectly, and plans react
   - Keeping community rating but weakening risk adjustment would make things much worse in terms of plan quality for sick consumers

APPENDIX

Removing reinsurance makes this worse
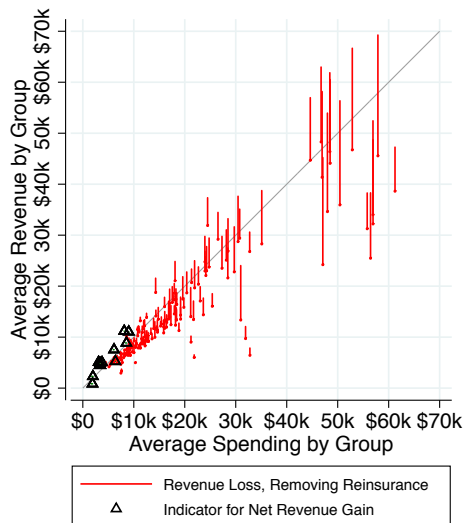
- For the high cost groups (red lines on right) there is a large decrease in profitability

- Mandatory, revenue-neutral reinsurance may be a state-based policy that can help fill some of the gaps left by risk adjustment

Fact 1: For most classes, selection incentives neutralized ▸Back

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Fact 3: No overall correlation between profitability and cost • Back
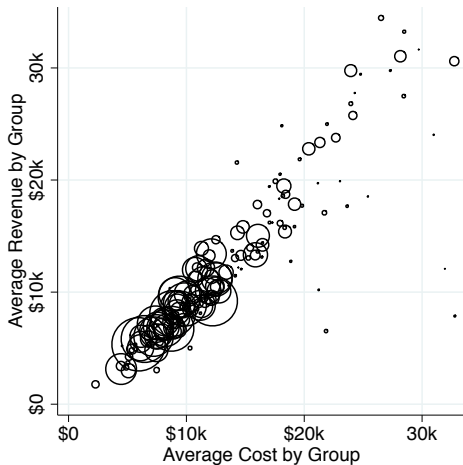
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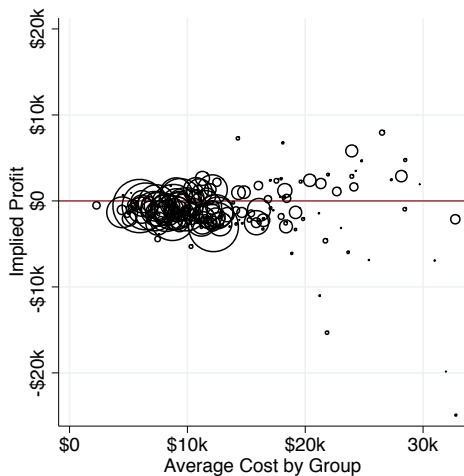
Most classes are clustered very near neutral

Ratio Measure

Ellis-McGuire Measure
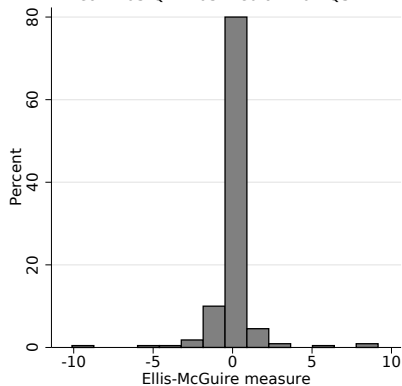
Main result: Selection incentive predicts restrictive tiering

$$Y_{jc} = \beta[\text{HIX}_j \times S_c] + \gamma_c + \alpha_j + \epsilon_{cj}$$

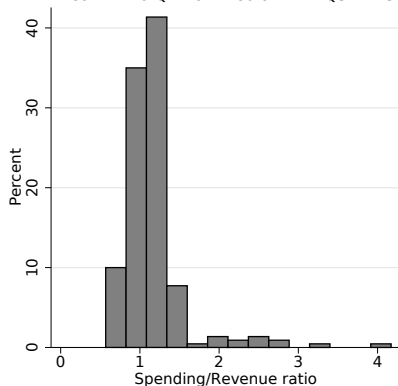|	**Panel A**		
Dependent Variable:	Fraction of Class Tiered Specialty or Higher		
Selection Incentive Variable:	Ratio (Cost/Revenue)	Difference (Cost - Revenue)	Ellis-McGuire Measure
	(1)	(2)	(3)
Exchange X Selection incentive	0.046***	0.044**	0.046***
	(0.014)	(0.017)	(0.018)
Therapeutic class FEs	X	X	X
Plan FEs	X	X	X
Therapeutic classes	220	220	220
Observations (plan X state X class)	858,440	858,440	858,440

- 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

What Are Insurers Responding To? Net Profitability

Already controlling for drug class FEs, but perhaps HIX plans are *differentially* attentive to high cost consumers...

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	Panel A					
	Implied Profits and Total Costs Horserace					
Selection Incentive Variable:	Ratio	Diff.	Ellis-McGuire	Ratio	Diff.	Ellis-McGuire
	(1)	(2)	(3)	(4)	(5)	(6)
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
Therapeutic class FEs	X	X	X	X	X	X
Plan FEs	X	X	X	X	X	X
Therapeutic classes	220	220	220	220	220	220
Observations (plan X state X class)	858,440	858,440	858,440	858,440	858,440	858,440

- $Y_{jc} = \beta[S_c \times \text{HIX}_j] + \delta[\text{Cost}_c \times \text{HIX}_j] + \gamma_c + \alpha_j + \epsilon_{cj}$

What Are Insurers Responding To? Net Profitability

Everything in a horserace...

	Ratio (13)	Diff. (14)	Ellis-McGuire (15)	Ratio (16)	Diff. (17)	Ellis-McGuire (18)
	Panel C					
	Profits, Drug Costs, and Total Costs Simultaneously					
Exchange X Selection incentive	0.045*** (0.014)	0.049** (0.021)	0.049** (0.024)	0.052*** (0.012)	0.027 (0.019)	0.024** (0.011)
Exchange X Average total cost associated with class	0.007 (0.013)	0.042* (0.024)	0.039 (0.029)			
Exchange X Average drug-only cost associated with class	0.046** (0.018)	0.001 (0.029)	-0.003 (0.037)			
Exchange X [Indicators for 20 total cost bins]				X	X	X
Exchange X [Indicators for 20 drug cost bins]				X	X	X
Therapeutic class FEs	X	X	X	X	X	X
Plan FEs	X	X	X	X	X	X
Therapeutic classes	220	220	220	220	220	220
Observations (plan X state X class)	858,440	858,440	858,440	858,440	858,440	858,440

Non-cost sharing hurdles to drug access matter too

$$Y_{jc} = \beta[S_{mc} \times \text{HIX}_j] + \gamma_c + \alpha_j + \epsilon_{cj}$$

	Panel B		
Dependent Variable:	Fraction of Class Prior Auth./Step Therapy/Not Covered		
Selection Incentive Variable:	Ratio (Cost/Revenue)	Difference (Cost - Revenue)	Ellis-McGuire Measure
	(7)	(9)	(11)
Exchange X Selection incentive	0.018*	0.020*	0.018*
	(0.011)	(0.011)	(0.010)
Therapeutic class FEs	X	X	X
Plan FEs	X	X	X
Therapeutic classes	220	220	220
Observations (plan X state X class)	858,440	858,440	858,440

Main Result: Non-linear Version ▸ Back

	Panel A					
Dependent Variable:	Fraction of Class Tiered Specialty or Higher					
Selection Incentive Variable:	Ratio (Cost/Revenue)		Difference (Cost - Revenue)		Ellis-McGuire Measure	
	(1)	(2)	(3)	(4)	(5)	(6)
Exchange X Selection incentive	0.046***	0.045**	0.044**	0.012	0.046***	0.010
	(0.014)	(0.022)	(0.017)	(0.014)	(0.018)	(0.015)
Exchange X Selection incentive ventile 20		0.006		0.300***		0.296***
		(0.105)		(0.076)		(0.089)
Therapeutic class FEs	X	X	X	X	X	X
Plan FEs	X	X	X	X	X	X
Therapeutic classes	220	220	220	220	220	220
Observations (plan X state X class)	858,440	858,440	858,440	858,440	858,440	858,440

	Panel B					
Dependent Variable:	Fraction of Class Tiered Prior Auth./Step Therapy/Not Covered					
Selection Incentive Variable:	Ratio (Cost/Revenue)		Difference (Cost - Revenue)		Ellis-McGuire Measure	
	(7)	(8)	(9)	(10)	(11)	(12)
Exchange X Selection incentive	0.018*	0.031**	0.020*	0.008	0.018*	-0.002
	(0.011)	(0.016)	(0.011)	(0.011)	(0.010)	(0.014)
Exchange X Selection incentive ventile 20		-0.074		0.108		0.159**
		(0.092)		(0.083)		(0.078)
Therapeutic class FEs	X	X	X	X	X	X
Plan FEs	X	X	X	X	X	X
Therapeutic classes	220	220	220	220	220	220
Observations (plan X state X class)	858,440	858,440	858,440	858,440	858,440	858,440

Main Result: Plots • Back
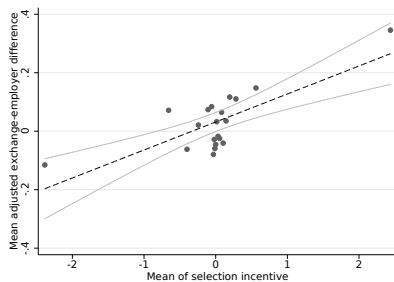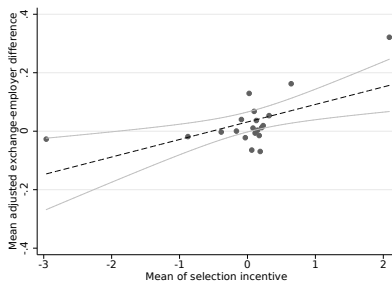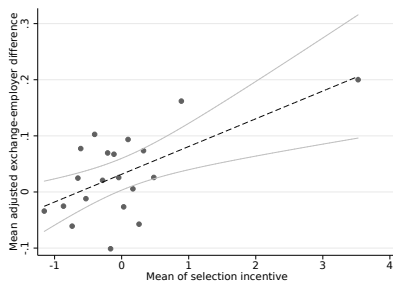
Just incentivizing substitution to cheaper drugs? No.

	Panel B					
Within-Class Subsample:	Least Expensive Drugs in Class					
	25th Percentile of Cost or Lower			10th Percentile of Cost or Lower		
Selection Incentive Variable:	Ratio	Diff.	Ellis-McGuire	Ratio	Diff.	Ellis-McGuire
	(7)	(8)	(9)	(10)	(11)	(12)
Exchange X Selection incentive	0.058***	0.049***	0.051**	0.061***	0.047**	0.048**
	(0.015)	(0.019)	(0.020)	(0.015)	(0.019)	(0.020)
Therapeutic class FEs	X	X	X	X	X	X
Plan FEs	X	X	X	X	X	X
Therapeutic classes	220	220	220	220	220	220
Observations (plan X state X class)	858,440	858,440	858,440	858,440	858,440	858,440

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

Just about nudging toward generics? No.

	Panel B		
Within-Class Subsample:	Generic Drugs Only		
Selection Incentive Variable:	Ratio (Cost /Revenue)	Difference (Cost - Revenue)	Ellis-McGuire Measure
	(4)	(5)	(6)
Exchange X Selection incentive	0.040***	0.029*	0.024
	(0.013)	(0.015)	(0.019)
Therapeutic class FEs	X	X	X
Plan FEs	X	X	X
Therapeutic classes	192	192	192
Observations (plan X state X class)	749,184	749,184	749,184

- 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

Just Different PBMs with Different Upstream Prices? No. ▶Back

Selection Incentive Variable:	Ratio	E-M	Ratio	E-M
	(1)	(2)	(3)	(4)
Marketplace X selection incentive	.041***	.038**	.046***	.042**
	(.013)	(.015)	(.014)	(.017)
Therapuetic class FEs	X	X	X	X
Plan FEs	X	X	X	X
PBM FE X selection incentive	X	X		
PBM FE X state X selection incentive			X	X
Therapuetic Classes	220	220	220	220
Observations (plan X state X class)	838,034	838,034	749,280	749,280

- e.g., Optum Rx Marketplace plans in Texas to Optum Rx ESI plans in Texas in cols 3 and 4
  $$Y_{jc} = \beta[S_c \times \text{HIX}_j] + \sum \delta_k[S_c \times \text{PBM}_k] + \gamma_c + \alpha_j + \epsilon_{cj}$$

Moral Hazard? We recode data to be matchable to Einav, Finkelstein, and Polyakova (2016) ▸Back
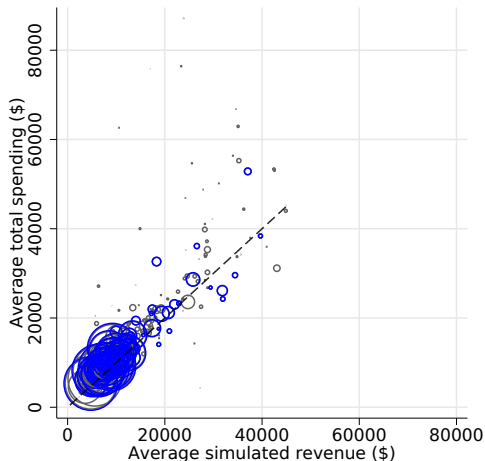
Moral Hazard? No: Selection Incentive Uncorrelated with Elasticity • Back