Internalizing Behavioral Externalities: Benefit Integration, Health Insurance and Welfare

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Motivation

- Health insurance, while mititgating financial risk, can create moral hazard.
  - Consumers may not have enough information to distinguish between high and low value services.
    - RAND HIE shows an equal reduction of high and low value services
    - similar results in recent studies (Brot-Goldberg et al. 2015)
  - Underutilization of high-value services creates potential for value-based insurance design (Chernew et al. 2007).
- Profit maximizing behavior by plans may mitigate underconsumption.
  - Firms can exploit behavioral biases of consumers (Grubb et al. 2012, Grubb 2014).
    - evidence of consumer biases in drug utilization (Abaluck et al. 2015, Dalton et al. 2015) in Medicare Part D
  - New work on "behavioral hazard" creates an theoretical framework for thinking about equilibrium effects (Baicker et al. 2015).

Research Question and Overview of Results

- Do plans correct for externalities associated with underutilization of cost effective health care services? How do plans respond to both moral and "behavioral" hazard?
  - take utilization as given
- We'll explore this in the Medicare Part D setting by comparing stand-alone PDP (which cover only drugs) and MA-PD plans (which cover total medical expenditure)
  - interesting setting because of the potential for prescription drug offsets
- Policy relevant
  - broad insurance design
  - programs to improve adherence, including the Part D Enhanced medication Therapy Management (MTM) model

Overview of Results

- Reduced form: use exogenous variation to infer that MA-PD plans spend more on drugs than their PDP counterparts
  - driven by cost considerations, rather than demand
  - not driven by selection
- Stuctural model: estimate the implied offsets using insurer plan design decisions
  - important because we do not observe medical claims for MA plans
  - estimates are similar to older results using demand side variation

Setting

- Broadly, Medicare enrollees can obtain drug coverage in one of two ways
  - through a Medicare Advantage plan that replaces Medicare Parts A and B
  - through a stand-alone Part D plan that supplements Medicare Parts A and B
- The standard Medicare Part D benefit is nonlinear
  - plans can increase generosity beyond the standard benefit
  - plans also have substantial discretion in designing formularies
- Evidence of non-optimal consumption in this setting (Abaluck et al. 2015, Dalton et al. 2015)

Data

- Medicare Part D Event Files
  - 10% of beneficiaries
  - observe each fill
  - aggregate to the beneficiary-year level for 2007-2009
- Medicare Part D Plan files
  - allow us to merge in plan pricing and formulary information
- county-level demographic information

Summary Statistics: Plans

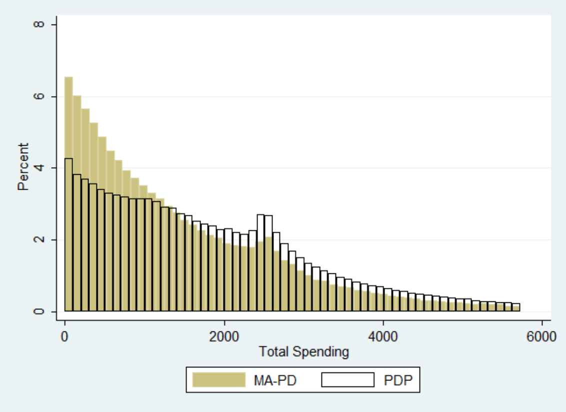
- MA-PD plans appear to have more generous cost-sharing that stand-alone PDPs.
- Table below describes means of premiums and a price index in multiple phases of the standard benefit.

	PDP	MA
1(Deductible)	.1912	.1655
P^{ICR}	.5026	.4608***
P^{Donut}	1.93	1.71***
Premium	23.16	12.77***
Observations	381	1926

Summary Statistics: Consumers

- MA-PD plans are advantageously selected.

Figure: Histogram of Total Drug Spending by Plan Type, 2008



Identification Strategy

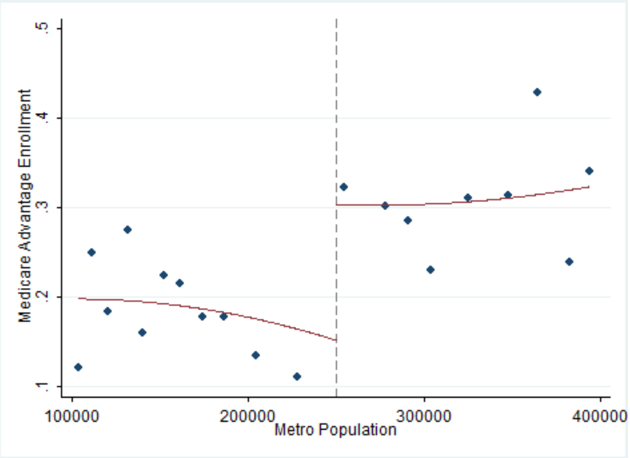
- Differential MA payment rates across counties lead to higher enrollment (Duggan, Starc, and Vabson 2014).
  - \$9,738 per enrollee per year in urban counties in 2009
  - \$8,811 per enrollee per year in rural counties in 2009
- Lawrence County (Ohio) is characterized as urban.
  - classified as being part of the Huntington-Ashland, WV metro area, population of 286k
- Washington County (Ohio) is characterized as non-urban.
  - classified as being part of the Parkersburg, WV metro area, population of 163k
- Estimating equations:

$$y_{itj} = X^1_{mt}\beta_1 + X^2_{it}\beta_2 + \beta_3 1(MA) + g(pop_{mt}) + \mu_{itj},$$

$$1(MA) = X^1_{mt}\gamma_1 + X^2_{it}\gamma_2 + \gamma_3 1(urban_{mt}) + g(pop_{mt}) + \nu_{itj}.$$

Identification Strategy

Figure: Effect of Population on MA Enrollment



OLS Results

Dependent Variable: Insurer Drug Costs			
1(MA)	-74.21***	-76.25***	-73.32***
	(3.969)	(3.973)	(3.972)
FFS 5 Year			0.430***
Avg. Spending			(0.0189)
R-Squared	0.217	0.219	0.221

- OLS results reflect advantageous selection into MA.
- first column controls for quintile of 2006 spending and year fixed effects
- second column also controls for demographics
- third column also controls for local FFS spending

IV Results

First Stage, Dependent Variable: MA Enrollment			
1 (Urban)	0.168***	0.170***	0.177***
	(0.00785)	(0.00785)	(0.00787)
FFS 5 Year			X
R-squared	0.026	0.036	0.037

- County-level urban status is a strong predictor of MA enrollment.

IV Results

Dependent Variable: Insurer Drug Costs			
1(MA)	514.2***	506.7***	387.5***
	(74.25)	(73.35)	(68.38)
FFS 5 Year			0.506***
Avg. Spending			(0.0226)
R-squared	0.114	0.119	0.159

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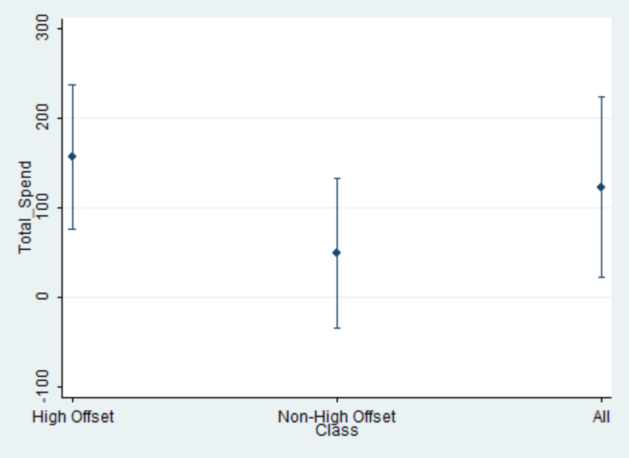
Dependent Variable: Total Drug Spending			
1(MA)	299.0***	284.6***	122.3***
	(108.0)	(106.7)	(100.7)
FFS 5 Year			0.688***
Avg. Spending			(0.0343)
R-Squared	0.230	0.233	0.252

Are firms correcting for underutilization?



- main effect of increased utilization is concentrated entirely in drugs with big offsets

Are firms correcting for underutilization?

Dependent Variable: Total Spending						
1(MA)	299.0***	284.6***	122.3***	515.2***	535.6***	299.4*
	(108.0)	(106.7)	(100.7)	(177.1)	(177.7)	(163.9)
FFS 5 Year			0.688***			0.862***
			(0.0343)			(0.0541)
R-Squared	0.230	0.233	0.252	0.133	0.132	0.172
Year Fixed Effects	X	X	X	X	X	X
Type Fixed Effects	X	X	X	X	X	X
Demographic Controls		X	X		X	X
Observations	381921	381921	381921	163435	163435	163435
Sample	100-400K	100-400K	100-400K	100-400K	100-400K	100-400K
		all			hyperlipidemics	

- first three columns are main results, last three columns restrict to hyperlipidemics
- main effect is larger for patients with chronic conditions
- main effect is larger in plans with lower attrition (see paper)

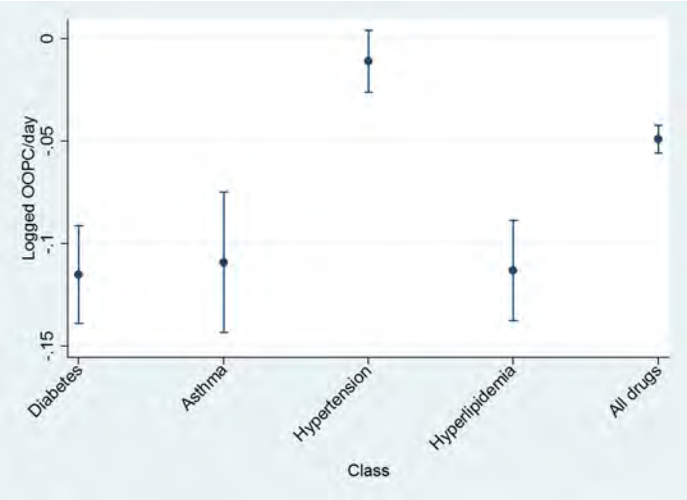
Are firms correcting for underutilization?

- MA-PD plans have lower OOPC for identical drugs in the same phase of the standard benefit.

	(1)	(2)
	Outcome: Logged OOPC/Day	
1(MA)	-0.075***	-0.049***
	(0.0002)	(0.0001)
Constant	-1.028***	-2.219***
	(0.0001)	(0.0004)
Observations	124,801,603	124,801,603
Adjusted R-Squared	0.607	0.673
	Outcome: 1(90 Day)	
1(MA)	0.001***	0.001***
	(0.0001)	(0.0001)
Constant	0.108***	0.103***
	(0.00005)	(0.0002)
Observations	157,091,471	157,091,471
Adjusted R-Squared	0.096	0.096
Product Fixed Effects	X	X
Phase Fixed Effects		X
All Products	X	X

Are firms correcting for underutilization?

- the price effect is larger in drug categories typically targeted by value-based insurance designs



Structural Model

- Goal: estimate the impact of increased plan generosity on insurer costs to distinguish between cost and demand motives for MA-PD plans
- Hypothesis: MA-PD plans find it less costly to increase generosity on drug benefits
  - additional spending on drugs saves money elsewhere
  - MA-PD plans capture this savings
- Approach: estimate the offset using first order condition with respect to plan characteristics
  - firms set premiums and phase-level coinsurance, taking the structure of the standard benefit as given.
  - use this to infer magnitude of the externality

Structural Model

- premiums, subsidies, drug costs, and shares are taken as given
- elasticities are take from plan demand system Demand
- medical costs are inferred from the first-order condition with respect to prices for MA-PD plans FOC
- take the first-order conditions with respect to premiums and phase-specific prices FOC
  - MA-PDP and stand-alone plans differ according to subsidies and the derivative of insurer costs with respect to phase-specific prices.
  - this derivative is the parameter of interest.
- identification in the structural model is driven by differences in drug spending relative to subsidies. Identification

Structural Model

- the average stand-alone PDP would save \$91 per member by increasing out-of-pocket costs by \$100
- the average MA-PD plan would only save \$60 per member by increasing out-of-pocket costs by \$100 Results

Structural Model

- the average stand-alone PDP would save $91 per member by increasing out-of-pocket costs by $100
- the average MA-PD plan would only save $60 per member by increasing out-of-pocket costs by $100 Results
- As plans spend more on drugs, some of the cost is offset by reductions in spending in other areas.
- Can use these estimates to quantify the size of the externality and drug offsets.

Counterfactuals I: Internalizing the Externality

- Set $\theta_{PDP} = \theta_{MA}$ and resolve the system of first-order conditions.

$\partial c / \partial OOPC$	Baseline		Internalize Offset		Internalize Offset	
	MA	PDP	MA	PDP	MA	PDP
Mean Premium	2.0754	4.0589	2.0754	4.0589	2.0602	4.1435
...% Change from Baseline	-	-	-	-	-0.0073	0.0208
Mean Insurer Spending	12.8522	12.1104	13.7607	13.6462	13.4580	13.6732
...% Change from Baseline	-	-	0.0707	0.1268	0.0471	0.1291

- Stand-alone plans would increase spending by 13% if they had to internalize the externality.

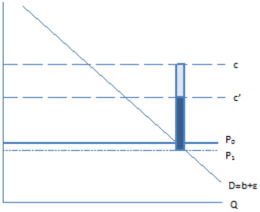
Implied Offsets

- Supply model implies the the lighter rectangle can be written as:

$$\frac{\partial c^{Medical}}{\partial \mathbf{P}} = \theta_2 \frac{\partial OOPC}{\partial \mathbf{P}},$$

- Demand theory implied the lighter rectangle can be written as:

$$\frac{\partial q}{\partial \mathbf{P}}(c - c').$$



- Implied discount is 19%.

Counterfactuals II: Cost-Sharing Subsidies

- Can the federal government impose a broad cost sharing subsidy that is revenue neutral and improves consumer welfare?
- Calculation change in consumption given a subsidy and increase premiums by the amount of the subsidy net of the offset effect.
- No. Consumers do not appear to be "sophisticated" about the potential for underconsumption.

Summary

- The federal government impose a broad cost sharing subsidy that is revenue neutral and improves consumer welfare because consumers do not appear to be "sophisticated" about the potential for underconsumption.
  - Health insurers will design plans to correct for inefficient underutilization if they have an incentive to do so.
  - Private firms can be more nimble than public programs.
- Differences in incentives across plan types drive the generosity of the benefits.
- Consumers in MA-PD plans have (causally) higher utilization and lower out-of-pocket costs.
  - effect is concentrated in drugs with large offsets
- A structural model allows us to quantify the size of this effect.
  - stand-alone PDPs would spend 13% more if they internalized the externality
  - equivalent to a 19% discount on drugs for MA-PD plans
- Whether or not firms exploit consumer biases on information frictions

Structural Model

- Profit for stand-alone plans is given by:

$$\Pi_{jmt} = \left(p_{jmt} + r_t^{PDP} - c_{jmt}^{Drug} \right) s_{jmt},$$

where p_{jmt} is the premium, r_t^{PDP} is the subsidy, and c_{jmt}^{Drug} are drug costs.

- Profit for MA-PD plans is given by:

$$\Pi_{jmt} = \left(p_{jmt} + r_t^{PDP} + r_{mt}^{MA} - c_{jmt}^{Drug} - c_{jmt}^{Medical} \right) s_{jmt},$$

where r_{mt}^{MA} is the (separate) MA subsidy and $c_{jmt}^{Medical}$ are non-drug medical costs.

- Object to estimate is:

$$\theta = \begin{cases} \frac{\partial c_{jmt}^{Drug}}{\partial P_{jmt}^{Phase}} + \frac{\partial c_{jmt}^{Medical}}{\partial P_{jmt}^{Phase}} & if\ MA = 1 \\ \frac{\partial c_{jmt}^{Drug}}{\partial P_{jmt}^{Phase}} & if\ MA = 0 \end{cases}$$

Structural Model

- First-order conditions for stand-alone plans are given by:

$$\left(p_{jmt} + r_t^{PDP} - c_{jmt}\right)\frac{\partial s_{jmt}}{\partial p_{jmt}} + s_{jmt} = 0$$

$$\left(p_{jmt} + r_t^{PDP} - c_{jmt}\right)\frac{\partial s_{jmt}}{\partial P_{jmt}^{Phase}} + \left(1 - \frac{\overbrace{\partial c_{jmt}^{Drug}}^{\theta_{PDP}}}{\partial P_{jmt}^{Phase}}\right) s_{jmt} = 0$$

$$\text{for } P_{jmt}^{ICR}, P_{jmt}^{Donut}.$$

Structural Model

- First-order conditions for MA-PD plans are given by:

$$\left(p_{jt} + r_t^{PDP} + r_{mt}^{MA} - c_{jmt}^{Drug} - c_{jmt}^{Medical}\right) \frac{\partial s_{jmt}}{\partial p_{jmt}} + s_{jmt} = 0$$

$$\left(p_{jt} + r_t^{PDP} + r_{mt}^{MA} - c_{jmt}^{Drug} + c_{jmt}^{Medical}\right) \frac{\partial s_{jmt}}{\partial P_{jmt}^{Phase}}$$

$$+ \left(1 - \overbrace{\left(\frac{\partial c_{jmt}^{Drug}}{\partial P_{jmt}^{Phase}} + \frac{\partial c_{jmt}^{Medical}}{\partial P_{jmt}^{Phase}}\right)}^{\theta_{MA}}\right) s_{jmt} = 0$$

$$\text{for } P_{jmt}^{ICR}, P_{jmt}^{Donut}.$$

Back

Plan Demand

- Estimate separate nested logits (Berry 1994) for each quintile of enrollees (based on 2006 drug spending)
  - instrument using our urban dummy and Hausman instruments
- Plan demand is given by:

$$u_{qjt} = X_{jt}\beta_q - \alpha_{p,qjt} p_{jtm} - \alpha_{P,qjt} OOPC_{qjtm} + \xi_{qjmt} + (1-\sigma)\varepsilon_{ijtm},$$

Quintile of 2006 Spending	(1)	(2)	(3)	(4)	(5)
Premium	-0.231**	-0.224***	-0.242***	-0.230***	-0.191***
	(0.0149)	(0.0135)	(0.0122)	(0.0112)	(0.0102)
OOPC	-0.0978***	-0.0695***	-0.0472***	-0.0287***	-0.0142***
	(0.00848)	(0.00608)	(0.00442)	(0.00311)	(0.00191)
Log(Inside Share)	0.229***	0.162***	0.203***	0.163***	0.0712***
	(0.0243)	(0.0264)	(0.0254)	(0.0263)	(0.0274)
Observations	81,553	82,423	83,958	84,767	85,812
Adjusted R-Squared	0.421	0.408	0.402	0.381	0.355

Empirical Implementation of Supply Model

- Infer MA medical costs from first order condition with respect to premium:

$$c_{jmt}^{Medical} = \left(p_{jmt} + r_{mt}^{MA}\right) + \sum_{q} \frac{s_{qjmt}/Q}{\frac{\partial s_{qjmt}}{\partial p_{jt}}},$$

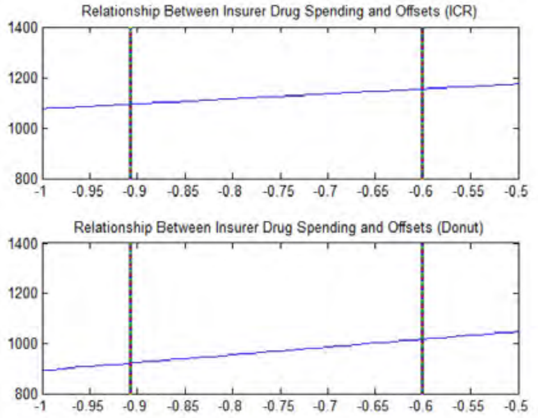
- Estimate the relation between OOPC and insurer total costs using first order conditions with respect to cost-sharing.

Back

Supply Results

$\partial c / \partial OOPC$	(1)	(2)	(3)
Constant	-0.8761	-0.9069	-0.9069
	(0.0102)	(0.0092)	(0.0102)
MA		0.3063	0.1861
		(0.0335)	(0.0351)
MA*Normalized Non-Drug Costs			0.1259
			(0.0203)
Plan-Market-Year Obs.	34,431	34,431	34,431

Identification



Back