Reclassification Risk in the Small Group Health Insurance Market

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Introduction

- One of the most important issues in designing markets for health insurance is reclassification risk
  - Reclassification risk occurs when an adverse and persistent health shock leads to higher future premiums or worse coverage
- Reclassification risk can lead to insurance market failure
  - Limits long-run risk protection from insurance
- 2010 Affordable Care Act (ACA) sought to reduce reclassification risk
  - Principally through community rating provisions
  - These exist for both individual and small group markets
- Restrictions on pricing based on risk may drive people out of market
  - This is adverse selection

Small group market

- We consider reclassification risk in the small group health insurance market
  - 18 million subscribers and $100 billion in revenue in 2013
  - Provides insurance to employers with 2-50 covered lives
- Sample period immediately before ACA *community rating* restrictions
- Reclassification risk potentially very important here:
  - Consider individual at an employer with 5 employees
  - Suppose individual or her co-worker is diagnosed with diabetes with an expected cost of $25,000 per year going forward
  - With *full experience rating*, premiums to employer will rise by $25,000
  - This will cost individual $5,000 per year in extra charges
  - Small size $\Rightarrow$ limited protection from reclassification risk

Premium variation in small group market

- A number of influential studies have documented substantial variation in premiums across employers in this market
  - Cutler (1994), Cebul et al. (2011), Bundorf et al. (2012)
  - Cutler finds that premiums at the 90th percentile are 2.74 times at the 10th percentile
  - Due to data limitations, he did not tie premium variation to health risk
- Findings consistent with substantial experience rating in this market
  - Cutler evidence seen as suggestive that there is substantial experience rating and reclassification risk in this market (Gruber, 2000)
- But, Pauly and Herring (1999) find low experience rating
  - They examine individual and small group markets
  - Find premium elasticity with respect to expected costs of -0.06 to 0.44
  - More similar to community rating that full experience rating
- We think extent and effects of reclassification risk not resolved
  - Data that link health risks to premiums seem useful to estimate extent

Goals of this paper

1. To evaluate extent of reclassification risk in the small group market and quantify resulting welfare loss
2. To understand the welfare consequences of community rating provisions relative to current environment and to full experience rating

We make use of a unique dataset on the small group market:

- Data provided to us by a large health insurer, which we refer to as "United States Insurance Company" (USIC)
- We have a four-year panel of their claims and premiums for 10 states
- Unique access to large dataset on the small group market

Overview of paper

- We develop a simple model of insurance in the small group market
  - Our model shows that the welfare loss from reclassification risk is increasing in pass-through from health risk to premiums
  - Pass-through coefficient is thus a "sufficient statistic" to understand reclassification risk
  - In the spirit of Chetty (2008, 2009) and Einav et al. (2010), we estimate this coefficient instead of estimating full structural model
- We control non-parametrically for selection into and out of USIC insurance in two ways:
  1. With our sample and individuals who drop or continue coverage
  2. With the MEPS data and individuals offered small group insurance
- Counterfactuals quantify welfare loss from reclassification risk
  - Compute using bounds for individuals who leave sample
  - Compare observed environment to full experience rating
  - Also, to community rating as mandated by the ACA
  - Quantify value of pooling in small group market versus individual market

Relation to literature

- Paper builds on substantial literature that analyzes reclassification risk
- On small group market:
  - Buchmueller and DiNardo (2002) consider impact of community rating on small group and individual markets
  - Bundorf et al. (2012) examines welfare effect of employee choice of different employer-sponsored plans
- On individual market:
  - Handel et al. (2015) evaluate equilibrium adverse selection and reclassification risk in a competitive market
  - Pauly et al. (1995) [PKH] and Handel et al. (2018) [HHW] consider potential long-term contracts with one-sided commitment
- We add to this literature in two ways:
  1. Our unique data allow us to identify the extent to which health insurance creates reclassification risk and selection in the real world
  2. We develop a theoretical framework that allows us to estimate risk, selection, and welfare in a simple way

Model

- Simple and stylized model of reclassification risk, pricing, and selection in health insurance industry
  - Two time periods, periods $t = 1, 2$; discount factor δ
  - Period represents a year, typical length of a health insurance contract
  - Empirical work extends beyond two years
- Index enrollees by i and employer by j
- Potential enrollees start each period with an expected risk score, r_{ijt}
  - Score is observable based on lagged claims data
  - Leads to health shock H with distribution $dF_H(H(r_{ijt}))$
  - Proportional to expected insured costs, $E[c^{ins}(H)] = \gamma r_{ijt}$
- Employer has mean risk score over its population, $R_{jt} = \frac{1}{I_j} \sum_{i=1}^{I_j} r_{ijt}$
- Insurer sets per-person premium based on employer history and score:

$$p_{jt} = p_j(R_{jt})$$

- Employers then decide on whether to offer insurance to potential enrollees
- Potential enrollees then decide on take-up

Per-period utility of potential enrollee

- Assume utility is additively separable across periods
- Per-period utility from obtaining insurance (if offered):
  - Function of income Y_{ijt}, premium, and out-of-pocket (oop) costs:

$$U^I(r_{ijt}, p_j(R_{jt})) = \int u\left[Y_{ijt} - p_j(R_{jt}) - c^{oop}(H)\right] dF_H(H(r_{ijt}))$$

    where c^{oop} is out-of-pocket costs
- Assumptions:
  - $u(x) = -\frac{1}{\sigma}\exp(-\sigma x)$, follows CARA functional form
  - Enrollee pays full p_{jt} through premiums or wage changes
- Per-period utility from not obtaining insurance:

$$U^N(r_{ijt}) = \int u\left[Y_{ijt} - c(H)\right] dF_H(H(r_{ijt}))$$

    where c is full costs
- Per-period utility overall (if offered insurance):

$$U(r_{ijt}, p_j(R_{jt})) = \max\left\{U^I(r_{ijt}, p_j(R_{jt})), U^N(r_{ijt})\right\}$$

Discounted total value of potential enrollee

- We can write the value function (which accounts for reclassification risk):

$$V(\vec{r}_{\cdot j1}, i) = U(r_{ij1}, p_j(R_1)) + \delta \int U(r_{ij2}, p_j(R_{j2}))dF_{R,r}(R_{j2}, r_{ij2}|\vec{r}_{\cdot j1})$$

  (where $\vec{r}_{\cdot j1}$ is vector of individual risks and $dF_{R,r}(R_2, r_{i2}|\vec{r}_{\cdot j1})$ is conditional risk score distribution)
- Individuals may face reclassification risk
  - Bad health shock for self or coworker may increase R_{j2}
  - This may in turn raise premiums p_{j2}
- Enrollee reclassification risk depends on:
  1. Distribution of employer mean risk score
     - With lots of enrollees, low risk
  2. Pass-through from R_{j2} to p_{j2}
     - With community rating, this pass through will be zero
- Individuals in small risk pools without community rating—i.e., people in our sample—may bear a lot of reclassification risk

Full experience rating case

- Consider now the case where all enrollees take up insurance
- Full experience rating implies that:

$$p_{jt}(R) = E[c(R)] = \gamma R_{jt}$$

(for ease of notation, assume that $c^{oop} = 0$)

- The discounted total value (with take-up) is:

$$V(\vec{r}_{\cdot j1}, i) = U^I(\gamma R_{j1}) + \delta \int U^I(\gamma R_{j2}) dF_R(R_{j2} | \vec{r}_{\cdot j1})$$

- In this case, enrollees are faced with reclassification risk
  - Insurer increases period 2 premium by the increase in risk
  - Purchasing health insurance each year would not solve this problem

Long term contracts

- Now consider a binding two-period contract with:
  1. $p_{j1} = \gamma R_{j1}$
  2. $p_{j2} = \gamma E[R_{j2}|\vec{r}_{.j1}]$
- Given risk averse individuals (as in CARA),

$$\int U^I(\gamma R_{j2}) dF_R(R_{j2}|\vec{r}_{.j1}) < U^I(\gamma E[R_{j2}|\vec{r}_{.j1}])$$

i.e. expected utility lower than utility of expectation

- Suppose further that income and risk are the same across periods
  - Above contract would maximize utility U^I over break-even contracts
  - Competitive insurance industry would result in this contract
- Implications:
  - Actuarially fair long-run contracts add value
  - Individual strictly prefers them to a risk-based contract in period 2

General case: different levels of pass through

- Now consider a simple functional form for premiums:

$$p_{jt} = c_{jt} + \beta R_{jt}$$

  - $\beta = \gamma \Rightarrow$ full experience rating
  - $\beta < \gamma \Rightarrow$ incomplete pass through
  - $\beta = 0 \Rightarrow$ community rating or binding two-period contracts
- c_{jt} reflects baseline prices at time t, e.g. from healthcare costs
- Note that if $\beta' < \tilde{\beta}$, then

$$\int U^I(Y_{ij2} - p_{j2} - c - \tilde{\beta}(R_{j2} - E[R_{j2}|\vec{r}_{\cdot j1}))dF_R(R_{j2}|\vec{r}_{\cdot j1})$$
$$< \int U^I(Y_{ij2} - p_{j2} - c - \beta'(R_{j2} - E[R_{j2}|\vec{r}_{\cdot j1}))dF_R(R_{j2}|\vec{r}_{\cdot j1})$$

  where $c_{jt} = c + \tilde{\beta}E[R_{j2}|\vec{r}_{\cdot j1}]$ or $c + \beta' E[R_{j2}|\vec{r}_{\cdot j1}]$ (across cases)
- Implication: β is a sufficient statistic for welfare from contract

Summary of reclassification risk

- Our model of pass through has three parameters, γ, β, and σ
  - For a given σ, the higher is β relative to γ, the greater is reclassification risk
- Will use them to understand:
  - Reclassification risk
  - Certainty equivalent welfare loss from this risk
  - Changes in these values under counterfactual pricing environments
- These parameters form sufficient statistics (as in Chetty, 2009 and Einav et al., 2010) to understand extent of reclassification risk in this market
  - Doesn't require estimation of full structural model
- To understand counterfactual welfare, we also need:
  - Estimates of the evolution of health risk over time
  - Assumptions on reclassification risk when individuals leave sample

Selection from offer and take-up decisions

- Employers observe premiums and decide whether to offer insurance
- If offered, enrollees then decide whether to take-up insurance
- The offer/take-up decision at time t is given by:

$$D_{ijt} = \mathbb{1}\{f(R_{jt}, r_{ijt}, x_{ijt}) + \varepsilon^{s}_{ijt} > 0\}$$

  where $f(\cdot)$ is a flexible mean utility function to be estimated
- The premiums that an enrollee faces at time t are:

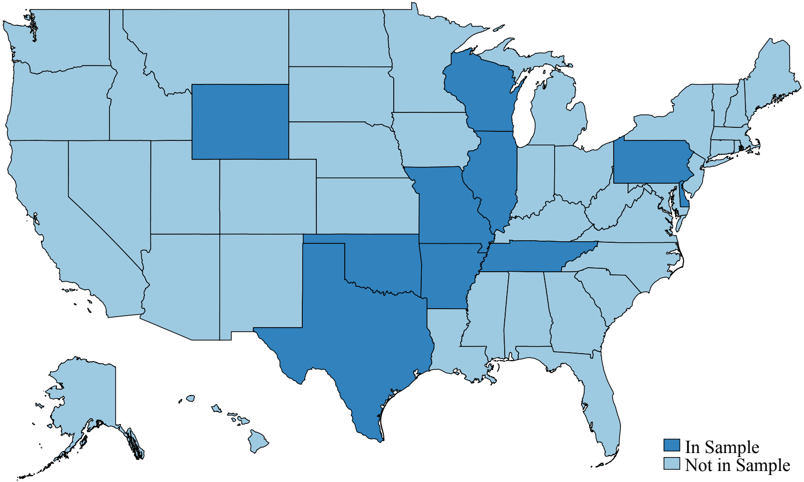
$$p_{ijt} = c_{jt} + \beta R_{jt} + \varepsilon^{p}_{ijt}$$

- We allow for correlations between $\varepsilon^{s}_{i \cdot t}$ and $\varepsilon^{p}_{i \cdot t}$
  - Expect negative correlation between premium and selection unobservables
  - ε^{p}_{ijt} will be highly correlated for individuals at same employer
- Our data contain premiums for potential enrollees who take up insurance
  - We use semi-parametric controls for selection
  - Counterfactuals model bounds for individuals who leave sample

Overview of main data

- We use data from large insurer, USIC
  - Data from 10 states: AR, DE, IL, PA, OK, MO, TN, TX, WI, WY
- Enrollee-level data: linked claims data from 2012-14
- Employer-level data: Premium and enrollment data from 2013-15
- For years and states in our data, relatively few pricing regulations
  - Community rating regulations under ACA technically started in 2014, but were minimal then
- Calculate 2013, 2014 and 2015 risk score from 2012, 2013, 2014 data respectively:
  - Use ACG methodology developed by Johns Hopkins
  - ACG risk score predicts relative current year expected health expenditure given lagged claims and expenditures

States in our estimation sample



Descriptive statistics on estimation sample

	Full Sample	Stayers	Joiners	Quitters
	Panel A: Enrollee-year level			
Unique individuals	336,755	80,031	87,107	113,124
Observations	646,904	240,093	176,163	186,012
Conditions (%)				
Acute myocardial infarction	0.16	0.16	0.16	0.17
Cancer	2.47	2.57	2.03	2.60
Hypertension	14.12	14.64	12.26	14.55
Diabetes	5.57	5.66	4.90	5.90
Health risk, r_{ijt}	1.00 (1.46)	1.01 (1.41)	0.92 (1.40)	1.05 (1.58)
$r_{ijt} - r_{ij,t-1}$	0.05 (1.07)	0.05 (1.03)	0.06 (1.04)	0.06 (1.19)
	Panel B: Employer-year level			
Employers	12,242	6,560	2,281	3,401
Observations	31,044	19,680	4,562	6,802
Subscribers	21 (27)	21 (26)	23 (27)	20 (28)
Take up rate (%)	54 (22)	54 (22)	57 (21)	53 (23)
Health risk for enrolled, R_{jt}	1.07 (0.72)	1.05 (0.70)	0.97 (0.59)	1.17 (0.82)
$R_{jt} - R_{j,t-1}$	0.02 (0.51)	0.01 (0.49)	0.04 (0.45)	0.05 (0.62)
Paid total claims ($)	4,076 (8,456)	4,003 (8,272)	3,775 (6,951)	4,490 (9,783)
Out-of-pocket claims ($)	1,092 (889)	1,051 (812)	1,061 (835)	1,232 (1,098)
Annual premiums ($)	6,162 (2,837)	6,248 (2,689)	5,385 (2,067)	6,433 (3,529)

Note: each observation is one small group enrollee or employer during one year, 2013-15. Table reports mean values (standard deviations). Enrollee “stayers” are employees always in sample; “joiners” are enrollees with one or more full observation but without a full observation in 2013 even though employer is in sample in 2013; and “quitters” are enrollees with one or more full observation but without a full observation in 2015 even though employer is in sample in 2015. Employer definitions are analogous.

Takeaways on selection

- Lots of movement in and out of USIC insurance
  - Small businesses frequently start and stop coverage
  - Potential enrollees also frequently start and stop take-up
- This movement is driven by at least three factors:
  1. Businesses opening and shutting down for reasons orthogonal to health risk
  2. Individuals changing jobs for reasons orthogonal to health risk
  3. Selection of health insurance based on risk and premiums
- Our results show some evidence that quitters are more expensive
  - Effect is moderate: “quitter” employers have 11% more claims cost than “stayer” employers
  - Our estimates (and counterfactuals) control for selection
  - Our counterfactuals use bounds for individuals who leave sample

MEPS data

- Nationally representative Medical Expenditure Panel Survey
  - Allows us to understand selection into small group market insurance take-up
- We use panel 18 from the consolidated data in 2013 and 2014
- We select individuals who:
  1. Were working (not self-employed) at the beginning of the period
  2. Had establishment size $\leq$ 50 individuals (small group)
  3. Were offered health insurance via the employer
- We use age, gender, health conditions, firm size, and firm sector

	Choose insurance	Age	Female	Employer size
Mean	0.72	41.77	0.52	21.47
Standard deviation	0.45	12.91	0.50	14.66
Observations	1,355	1,355	1,355	1,355

Empirical approach

- Our main empirical goal is to recover γ and β
  - Together, they get at insurer pass through:

$$\frac{\partial p}{\partial E[c^{ins}]} = \frac{\partial p / \partial R}{\partial E[c^{ins}] / \partial R} = \frac{\beta}{\gamma}$$

  - We use them separately in our counterfactual analysis
- We estimate γ with regressions of claims costs on risk scores
- We estimate β with selection-adjusted regressions of premiums on employer mean risk scores

Estimation of impact of risk score on claims: γ

- γ scales risk scores into claims dollars
- We estimate regressions of the form:

$$c_{ijt}^{ins} = \gamma r_{ijt} + \gamma_2 x_{jt} + \varepsilon_{ijt}^{r}$$

- Regression done just for 2014
- x_{jt} includes market fixed effects
- Main identifying assumption:
  - Market FEs control for provider price variation

Estimation of pass through from risk to premiums: β

- Following Newey (2009), we estimate a two-step semi-parametric selection model:
  1. Estimation of selection model
     - ★ Estimation of $D_{ijt} = \mathbb{1}\{f(R_{jt}, r_{ijt}, x_{ijt}) + \varepsilon^s_{ijt} > 0\}$ with probit specification and flexible form for $f(\cdot)$
     - ★ Define $S_{ijt} \equiv Pr(f(R_{jt}, r_{ijt}, x_{ijt}) + \varepsilon^s_{ijt} > 0)$
  2. Estimation of pass through with selection correction

$$p_{jt} = \beta R_{jt} + \alpha x_{jt} + \overline{FE}_{ij} + FE_t + g(S_{ijt}) + \varepsilon^p_{jt}$$

- ★ From theory model, interpretation is:

$$c_{jt} = \overline{FE}_{ij} + FE_t + \alpha x_{jt} + \varepsilon^p_{jt}$$

- ★ Non-parametric selection correction $g(S_{ijt})$ (using power series approximation)
- ★ Intuition: approximates inverse Mills ratio from Heckman (1979)

More details on selection and pass through estimation

- We estimate two different specifications for selection equation $f(\cdot)$:
  1. Selection equation from USIC data
     - ★ Selection sample at time t is individuals enrolled at time $t-1$
     - ★ Variables in $f(\cdot)$: R_{jt}, r_{ijt}, industry, employer size, age, and gender
     - ★ Advantage: lots of regressors increases accuracy of selection equation
     - ★ Disadvantage: only controls for individuals who left USIC
  2. Selection equation from MEPS data
     - ★ Variables in $f(\cdot)$: proxy for r_{ijt}, industry, employer size, age, and gender
     - ★ Proxy with indicators for hypertension, heart disease, AMI, ischemic stroke, respiratory failure, cancer, diabetes, and asthma
     - ★ Fewer regressors but controls for everyone offered insurance
- Identification
  - Exclusion restrictions needed to credibly identify selection effects
    - ★ Industry and individual risk provide useful exclusion restrictions
    - ★ Multiple data sources for robustness
  - Have employer fixed effects for treatment equation in most specifications
    - ★ Identification of β based on changes in p_{jt} following changes in R_{jt}

Impact of expected risk on claims costs: γ

Table: Pass through from expected risk to claims

	Dependent variable:		
	Paid amount ($)	Allowed amount ($)	OOP amount ($)
Regressor:	(1)	(2)	(3)
Enrollee ACG score, r_{ijt}	4,003***	4,483***	480***
	(129)	(131)	(9)
Market FE	Yes	Yes	Yes
Observations	204,913	204,913	204,913

Note: each observation is one enrollee during one year. The dependent variables indicate three measures of the total claims amount for that enrollee. The sample is covered individuals with an ACG score in 2014 only. Markets are defined by USIC and roughly represent an MSA or state. Standard errors are clustered at the employer level. *** indicates significance at the 1% level.

- A unit increase in *R* increases claims cost by $4,003
- Results with splines are similar

Estimation of selection equation using USIC and MEPS samples

	(1)	(2)	(3)	(4)
	Sample USIC		Sample MEPS	
	Dependent variable:			
	Drop coverage$_{ijt}$		*Decline insurance$_{ijt}$*	
	Average marginal effect	Standard error	Average marginal effect	Standard error
R_{jt}	0.067***	(0.009)		
r_{ijt}	0.008	(0.008)		
Age$_{ijt}$	−0.001***	(0.0001)	0.005***	(0.001)
Female$_{ijt}$	0.003	(0.003)	−0.039	(0.261)
Firm size$_{jt}$	0.001***	(0.0002)	0.001	(0.001)
Hypertension$_{j,t-1}$			−0.001	(0.030)
Heart disease$_{j,t-1}$			0.089	(0.092)
AMI$_{j,t-1}$			−0.177	(0.121)
Ischemic stroke$_{j,t-1}$			-0.116	(0.124)
Respiratory failure$_{j,t-1}$			0.064	(0.063)
Cancer$_{j,t-1}$			−0.054	(0.061)
Diabetes$_{j,t-1}$			0.019	(0.051)
Asthma$_{j,t-1}$			0.027	(0.041)
Industry fixed effects	Yes	Yes	Yes	Yes
Observations	204,913		1,355	

Note: "Drop coverage$_{ijt}$" indicates that individual was in sample in period t but not $t+1$.

- Firm risk R_{jt} predicts leaving USIC sample
- Most regressors not significant for MEPS sample

Main results: impact of risk on premiums: β

Table: Pass through from risk to premiums with USIC sample correction

	(1)	(2)	(3)	(4)
	Observation level:			
	Employer/year	Enrollee/year	Enrollee/year	Enrollee/year
	No selection correction		With selection correction	
Panel A: Estimations with employer/enrollee fixed effects				
Health risk for enrolled, R_{jt}	188**	195***	663***	624***
	(87)	(82)	(132)	(121)
Panel B: Estimations with market fixed effects				
Health risk for enrolled, R_{jt}	1,749***	2,263***	2,594***	2,811***
	(120)	(88)	(94)	(116)
FE Year	Yes	Yes	Yes	Yes
Polynomial Order	No	No	1^{st}	6^{th}
Observations	31,044	448,259	448,259	448,259

Note: each observation is either one employer or enrollee during one year. The dependent variable is the premium charged the employer by USIC divided by the number of covered lives. R_{jt} is calculated based on individuals that worked in the employer last year and had a ACG score. Column (1) in Panel A includes employer fixed effects. Columns (2) to (4) in Panel A include enrollee fixed effects. Standard errors are clustered at the enrollee and year levels. $***$ indicates significance at the 1% level and $**$ indicates significance at the 5% level.

- Results with MEPS selection correction are not statistically different from non-selection-corrected estimates

Selection MEPS

Takeaways from main results

- Across specifications, pass through is only 16 – 70% of claims cost
  - With employer FEs, a unit increase in R increases premiums by $624
  - Without FEs, effect is larger—$2,811—but still much smaller than cost
- How do we interpret difference between estimates with and without FEs?
  - With FEs: estimates risk pass through for existing employers
  - Without FEs: may reflect higher risk rating for new accounts
- Selection-corrected results somewhat larger than uncorrected results
  - Consistent with higher risk people disproportionately quitting insurance
- “Idiosyncratic” risk also present in this market
  - Standard deviation of premiums is $576 in FE model
  - Though not correlated with risk, this also affects welfare

Robustness

1. Robustness to measurement error from risk score definition Table
2. Robustness to the inclusion of chronic conditions Panel A Panel B
3. No significant change in other benefits when risk increase Table
4. Splines to check linear relationship between risk and claims Table
5. Splines to check linear relationship between risk and premiums Table
6. Roll out of ACA regulations over time do not generate this slow pass through Table

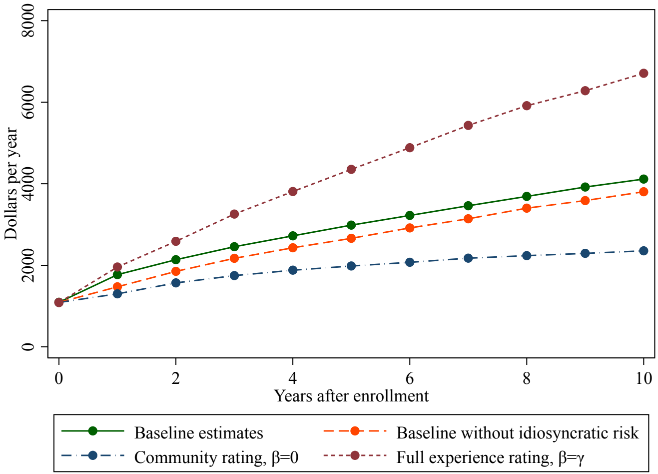
Why is pass through low?

- Low pass through observed in a variety of settings
  - Ganapati, Shapiro, and Walker (2016) for energy costs
  - De Loecker et al. (2016) for tariffs
  - Cawley, Willage, and Frisvold (2018) for beverage taxes
- Insurer one-sided commitment can generate low pass-through
  - PKH propose one-sided "guaranteed renewability" contracts
  - HHW consider optimum over such contracts
    - ★ We simulate β from HHW data and results for 25 & 30-35 year olds Details
    - ★ Find HHW optimal $\beta = \$1,821$; very similar to our non-FE results
    - ★ Optimal β likely lower with switching costs
  - USIC may be using its reputation to provide one-sided commitment
- Limited or no support for other explanations:
  1. No evidence that pass through occurs slowly over time Table
  2. No evidence pass through varies based on market power Table
  3. Limited impact of search frictions: back-of-the-envelope calculation using Cebul et al. (2011) shows 87% pass through

Computation of counterfactuals

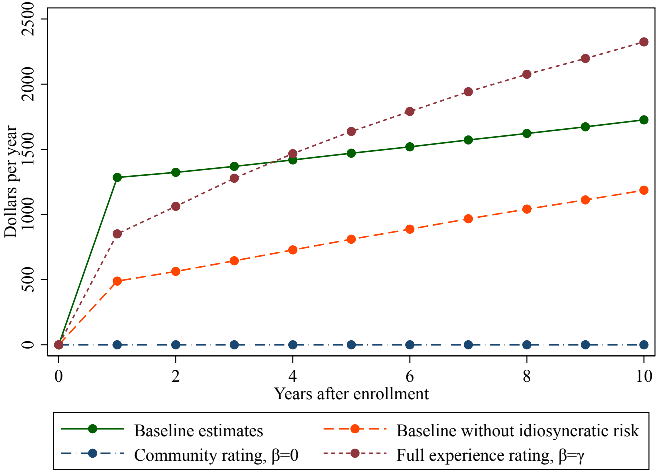
- Steps to counterfactual approach
  1. Non-parametrically construct 10 year path of r_{ijt} and R_{jt}
     - ★ We use risk model with two lags
  2. Evaluate how future risk distribution translates into future premium distribution and oop costs, under baseline and counterfactuals
     - ★ When individuals remain at employer: use FE/selection controlled β estimate
     - ★ When individuals leave sample: bound them as facing draw from cross-sectional premium distribution
     - ★ With selection model, individuals who stay have selected premium distribution
     - ★ Model residual distribution for idiosyncratic risk
  3. Examine how this risk translates into utility loss for insured
     - ★ We use CARA preference parameter of $\sigma = 0.000428$ from Handel (2013)
     - ★ Examine robustness to less risk averse ($\sigma = 0.00008$) as in HHW
     - ★ Certainty equivalent price independent of income
- We show, for a ten year horizon after insurance purchase:
  - ▸ Certainty equivalent income loss from risk
  - ▸ Standard deviation of premiums and healthcare expenditures

Mean certainty equivalent income loss from risk



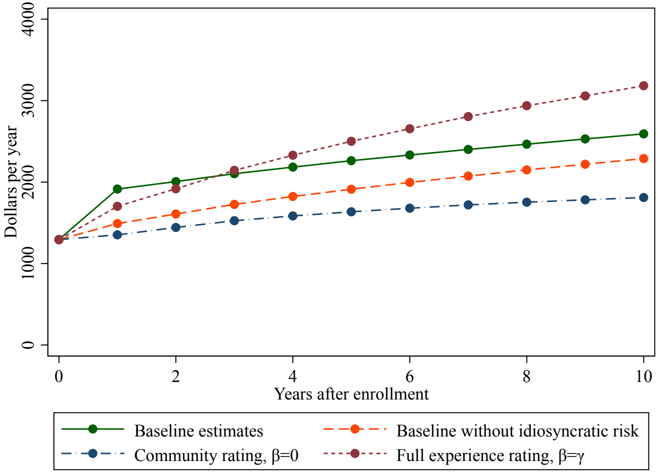
- USIC's pricing policy adds value relative to full experience rating
- Results similar but smaller with $\sigma = 0.00008$ Table

Mean standard deviation in premiums



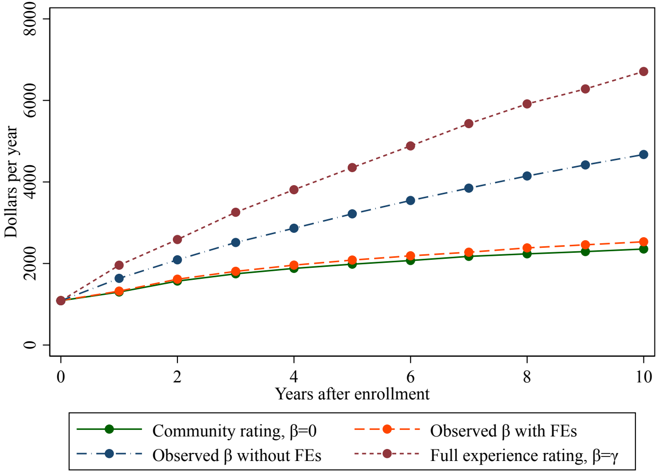
- Std. dev. of premiums mostly from idiosyncratic risk and switchers

Mean standard deviation in health care expenditures



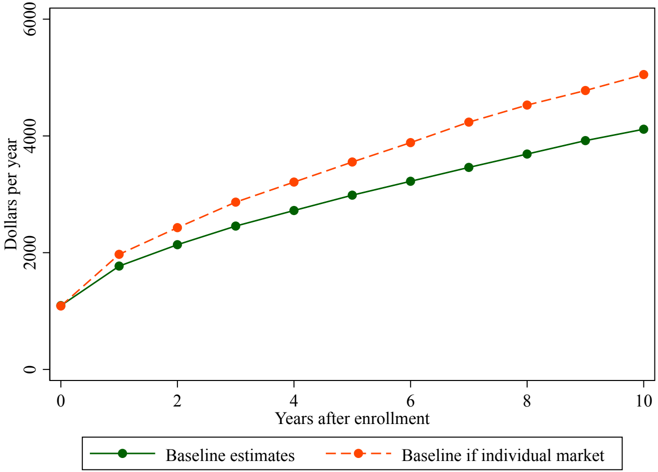
- OOP spending adds a lot of risk

Value generated by different risk pricing policy



- Low risk pricing adds substantial value (not shown on figure: mitigated by selection and idiosyncratic risk)
- Results similar but smaller with $\sigma = 0.00008$ Table

Value created by pooling within small group



- Pooling within small group adds moderate value relative to individual insurance with same pass through

Conclusion

- We seek to understand extent of reclassification risk in small group health insurance market
  - Use sample of over 12,000 employers
  - Evaluate extent to which insured health risk at employer is passed through in the form of higher premiums
- Main findings:
  1. Between 16% and 70% pass through from expected costs to premiums
     - Pass through is closer to community rating than to full experience rating
  2. Some selection of high risk people out of USIC insurance
     - Controlling for selection increases estimated pass through moderately
  3. USIC's pricing policy provided substantial risk protection
     - Results consistent with optimal one-sided commitment models of pricing
     - Idiosyncratic premium risk still important
  4. High out-of-pocket costs also generate substantial risk
- Results robust to measurement of risk score and other factors
- Little value from pooling within small group
  - Similar welfare for individual insurance with same pricing policy

Appendix

Main results with MEPS correction: impact of risk on premiums: β

Table: Pass through from risk to premiums using MEPS sample correction

	(1)	(2)	(3)	(4)
	Observations Level:			
	Employer/year	Enrollee/year	Enrollee/year	Enrollee/year
Panel A: Estimations with employer/enrollee fixed effects				
Health risk for enrolled, R_{jt}	188**	195***	195	196
	(87)	(82)	(82)	(92)
Panel B: Estimations with market fixed effects				
Health risk for enrolled, R_{jt}	1,749***	2,263***	2,210**	2,175***
	(120)	(88)	(88)	(93)
FE Year	Yes	Yes	Yes	Yes
Polynomial Order	No	No	1^{st}	6^{th}
Observations	31,044	448,259	448,259	448,259

Note: each observation is either one employer or enrollee during one year. The dependent variable is the premium charged the employer by USIC divided by the number of covered lives. R_{jt} is calculated based on individuals that stay in the employer with an ACG score from last year. Column (1) in Panel A includes employer fixed effects. Columns (2) to (4) in Panel A include enrollee fixed effects. Standard errors are clustered at the enrollee and year levels. *** indicates significance at the 1% level and ** indicates significance at the 5% level.

- Results with MEPS correction are not statistically different from main estimates return

Table: ACG score and claims pass-through to premiums, by market concentration

	Dependent variable: annual employer mean premium, p_{jt}		
	(1)	(2)	(3)
Panel A: market HHI			
Health risk for enrolled, R_{jt}	624^{**} (121)	617^{**} (146)	700^{**} (116)
HHI		0.035^{***} (0.008)	0.057 (0.032)
$R_{jt} \times$ HHI			-0.023 (0.057)
Panel B: share of largest insurer			
Health risk for enrolled, R_{jt}	624^{**} (121)	617^{**} (87)	711^{**} (101)
Share of leader insurer		280^{**} (58)	447^{**} (245)
$R_{jt} \times$ Share of leader insurer			-174 (228)
Enrollee FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	448,259	448,259	448,259

Note: each observation is one enrollee during one year. Markets are defined by USIC and roughly represent an MSA or state. R_{jt} is calculated based on individuals that worked in the employer last year and had a ACG score. HHI and share of leader insurer indexes are taken from Kaiser Family Foundation State Health Facts database. Standard errors are clustered at the employer level. *** indicates significance at the 1% level and ** indicates significance at the 5% level.

return

Table: Pass through from risk to premiums with lagged risk score

Dependent variable: annual employer mean premium, p_{jt}				
Regressor:	(1)	(2)	(3)	(4)
Health risk for enrolled, R_{jt}	624**	450	2,811***	1,822**
	(121)	(92)	(109)	(112)
Lagged health risk for enrolled, $R_{j,t-1}$		218		1,311**
		(54)		(98)
Year FE	Yes	Yes	Yes	Yes
Enrollee FE	Yes	Yes	No	No
Market FE	No	No	Yes	Yes
Observations	448,259	160,062	448,259	264,145

Note: each observation is one enrollee during one year. The dependent variable is the premium charged the employer by USIC divided by the number of covered lives. R_{jt} is calculated based on individuals that worked in the employer last year and had a ACG score. Standard errors are clustered at the employer level. *** indicates significance at the 1% level and ** indicates significance at the 5% level.

return

Table: Pass-through from expected risk to claims using splines

Regressor:	Dependent Variable: Paid amount ($) (1)	(2)	(3)	(4)
Spline employee ACG score, $r_{ijt} \in [0, 1)$	2,746***	2,836***		
	(94)	(96)		
Spline employee ACG score, $r_{ijt} \in [1, 2.5)$	3,174***	3,190***		
	(151)	(151)		
Spline employee ACG score, $r_{ijt} \in [2.5, 5)$	4,284***	4,282***		
	(361)	(361)		
Spline employee ACG score, $r_{ijt} \in [5, \infty)$	4,692***	4,689***		
	(398)	(398)		
Spline employee ACG score, $r_{ijt} \in [0, .32)$			2,503***	2,633***
			(559)	(563)
Spline employee ACG score, $r_{ijt} \in [.32, .57)$			3,756***	3,814***
			(411)	(411)
Spline employee ACG score, $r_{ijt} \in [.57, 1.13)$			1,189***	1,289***
			(421)	(420)
Spline employee ACG score, $r_{ijt} \in [1.13, \infty)$			4,345***	4,344***
			(185)	(185)
Market FE	No	Yes	No	Yes
Splines	Fixed cut points	Fixed cut points	Quartiles	Quartiles
Observations	204,913	204,913	204,913	204,913

Note: each observation is one enrollee during one year. The dependent variables indicate the total claims amount paid by USIC for that enrollee. The sample is covered individuals with an ACG score in 2014 only. Standard errors are clustered at the employer level. *** indicates significance at the 1% level. return

Table: Pass through from risk to premiums using splines

	Dependent variable: annual employer mean premium, p_{jt}			
	(1)	(2)	(3)	(4)
Health risk for enrolled, R_{jt} (.,.72)	943**	2,641***	493	1,088**
	(173)	(241)	(374)	(159)
Health risk for enrolled, R_{jt} [.72,.91)	952**	2,157***	509**	1,063**
	(191)	(183)	(287)	(188)
Health risk for enrolled, R_{jt} [.91,1.12)	941*	4,627***	471	1,010*
	(216)	(201)	(364)	(306)
Health risk for enrolled, R_{jt} [1.12,.)	523**	2,143***	346	586 **
	(105)	(189)	(186)	(114)
Sample	All	All	Smaller employers	Larger employers
Enrollee FE	Yes	No	Yes	Yes
Market FE	No	Yes	No	No
Year FE	Yes	Yes	Yes	Yes
Observations	448,259	448,259	81,614	366,645

Note: each observation is one enrollee during one year. The dependent variable is the premium charged the employer by USIC divided by the number of covered lives. R_{jt} is calculated based on individuals that worked in the employer last year and had a ACG score. Smaller employers are those with 13 or fewer covered lives in all sample years; larger employers are all others. Standard errors are clustered at the employer level. *** indicates significance at the 1% level and ** indicates significance at the 5% level.

return

Table: Pass through from expected risk to premiums, with chronic conditions

Dependent Variable: Annual employer mean premium, p_{jt}					
Panel A: Effect controling for chronic conditions					
Regressor:	(1)	(2)	(3)	(4)	(5)
Health risk for enrolled, R_{jt}	624^{**}	648^{**}	626^{**}	625^{**}	628^{**}
	(116)	(117)	(135)	(124)	(116)
Lag % cancer at employer		2^{**}			
		(4)			
Lag % transplant at employer			2		
			(2)		
Lag % AMI at employer				1	
				0.5)	
Lag % diabetes at employer					1
					(0.3)
Year FE	Yes	Yes	Yes	Yes	Yes
Enrollee FE	Yes	Yes	Yes	Yes	Yes
Observations	448,259	448,259	448,259	448,259	448,259

Note: each observation is one enrollee during one year. The dependent variable is the premium charged the employer by USIC divided by the number of covered lives. R_{jt} is calculated based on individuals that worked in the employer last year and had a ACG score. Chronic disease regressors indicate the mean percent of enrollees with a claim for the disease in the previous year. Standard errors are clustered at the employer level. *** indicates significance at the 1% level.

return

Table: Pass through from expected risk to premiums, with chronic conditions

Dependent Variable: Annual employer mean premium, p_{jt}					
Panel B: Effect controling for chronic conditions					
Regressor:	(1)	(2)	(3)	(4)	(5)
Health risk for enrolled, R_{jt}	624^{**}	627^{**}	633^{**}	627^{**}	625^{**}
	(116)	(120)	(119)	(116)	(119)
Lag % hypertension at employer		0.2			
		(0.1)			
Lag % heart failure at employer			2^{**}		
			(0.4)		
Lag % kidney disease at employer				0.7	
				(0.3)	
Lag % asthma at employer					0.2
					(0.1)
Year FE	Yes	Yes	Yes	Yes	Yes
Enrollee FE	Yes	Yes	Yes	Yes	Yes
Observations	448,259	448,259	448,259	448,259	448,259

Note: each observation is one enrollee during one year. The dependent variable is the premium charged the employer by USIC divided by the number of covered lives. R_{jt} is calculated based on individuals that worked in the employer last year and had a ACG score. Chronic disease regressors indicate the mean percent of enrollees with a claim for the disease in the previous year. Standard errors are clustered at the employer level. *** indicates significance at the 1% level.

return

Table: Effects of expected risk on benefits

	Dependent variable		
Regressor:	In-network maximum OOP ($) (1)	Coinsurance rate (%) (2)	In-network deductible ($) (3)
Health risk for enrolled, R_{jt}	303	-0.43	159
	(113)	(0.57)	(58)
Year FE	Yes	Yes	Yes
Enrollee FE	Yes	Yes	Yes
Observations	448,259	448,259	448,259

Note: each observation is one enrollee during one year. Each dependent variable is a measure of plan benefits. R_{jt} is calculated based on individuals that worked in the employer last year and had a ACG score. Standard errors are clustered at the employer level. $**$ indicates significance at the 5% level and $*$ indicates significance at the 10% level.

return

Table: Pass through from risk to premiums with heterogeneity by different periods

Dependent variable: annual employer mean premium, p_{jt}				
	(1)	(2)	(3)	(4)
Health risk for enrolled, R_{jt}	568*	2,903**	440*	2,766***
	(85)	(53)	(68)	(166)
Sample Years	2013-14	2013-14	2014-15	2014-15
Enrollee FE	Yes	No	Yes	No
Market FE	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	281,932	325,080	246,358	307,293

Note: each observation is one enrollee during one year. The dependent variable is the premium charged the employer by USIC divided by the number of covered lives. R_{jt} is calculated based on individuals that worked in the employer last year and had a ACG score. Standard errors are clustered at the employer level. $***$ indicates significance at the 1% level and $**$ indicates significance at the 5% level.

return

Robustness to measurement error

1. Compare to USIC's risk score for 227 employers in 2013 (with both):
   - Pearson correlation is 0.836 and the Spearman (rank) correlation is 0.881
   - Find *smaller* β with this sample for USIC's risk score than for ACG score
2. Instrument for ACG score with own risk score (ORS):
   - Constructed ORS using claims data and random forest techniques
   - Used ORS as instrument for ACG score and find smaller and imprecisely estimated β with employer FEs
3. Size of measurement error too small for full pass through:
   - Robustness checks suggest uncorrelated measurement error
   - Formula is $\beta^{estimate} = \beta^{true} \frac{\sigma_{RR}}{\sigma_{RR} + \sigma_{\omega\omega}}$, where:
     - ★ $\sigma_{\omega\omega} = 0.22$ is the variance of the measurement error
     - ★ $\sigma_{RR} = 0.52$ is variance of the (USIC) true risk score
   - In this case, $\beta^{true} = 624 / \frac{\sigma_{RR}}{\sigma_{RR} + \sigma_{\omega\omega}} = \$893$
   - Measurement error of this size doesn't get us close to full pass through

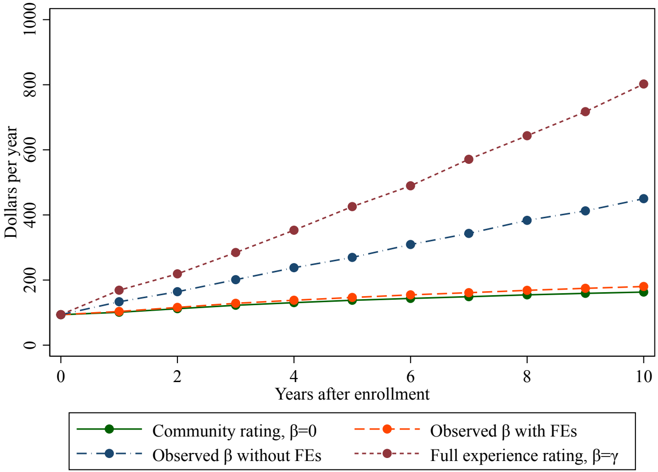
return

Computation of HHW pass through coefficient

- We simulate β under HHW's estimated optimum using their reported:
  - Optimal contract for "flat net income"
  - Premiums for the first year of the optimal contract starting at age 25
  - Premium matrix for second year of the optimal contract starting at age 25
  - Current expected expenses by ACG score bin
  - Health status bin probabilities for 30-35 years old
  - Health status transition by bin for this population
- With these data we estimate a weighted regression of the change of premiums on change of health expenses
  - We find $\beta =$$1,821 ($410), similar to our OLS estimate
  - Using health statuses from 40-45 years olds, $\beta =$$1,720 ($390)
- HHW find switching costs make one-sided contract closer to optimum
  - Likely even smaller pass-through in this setting

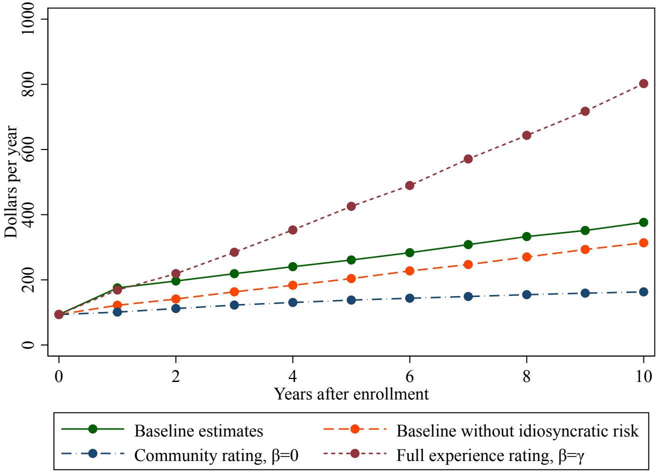
return

Value generated by different risk pricing policy



- Effects smaller with less risk aversion but still relative differences are large Return

Mean certainty equivalent income loss from risk



- Effects smaller with less risk aversion but still relative differences are large Return