Reclassification Risk in the Small Group Health Insurance Market

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Introduction

- A very important issue in designing markets for health insurance is 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
- A main goal of 2010 Affordable Care Act (ACA) is to reduce reclassification risk
  - Principally through community rating provisions
  - These exist for both individual and small group markets

Reclassification risk in small group market

- We consider reclassification risk in the small group health insurance market
  - Provides insurance to employers with 2-50 employees
  - 18 million subscribers and $100 billion in revenue in 2013
- Reclassification risk potentially very salient 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
  - A market that passes through risk to the employer will increase premiums by $25,000
  - This will cost individual $5,000 per year in extra charges

Reclassification risk prior to ACA

- How much reclassification risk existed in small group market before the ACA?
- On one hand, influential studies have documented substantial variation in premiums
  - Cutler (1994), Cebul et al. (2011), Bundorf et al. (2012)
  - A plausible cause of this premium variation is reclassification risk, from employers with higher health risk facing higher premiums (Gruber, 2000)
- On the other hand, findings of low correlation between premiums and health risk
  - Using survey data, Pauly and Herring (1999) find this in both individual and small group plans
  - Herring and Pauly (2006) attribute this to market providing reclassification risk protection
  - Posit “guaranteed renewability” contracts that don’t increase rates when health risk increases
- Thus, overall there are mixed findings here and more evidence is needed
  - Better understanding of reclassification risk in this market is important
  - Particularly true given centrality of reclassification risk reduction to ACA (and importance of ACA)

Goals of this paper

1. To examine extent of reclassification risk in the small group market
2. To evaluate the mechanisms underlying the reclassification risk that we find
3. To understand the welfare consequences of alternate pricing policies relative to current environment

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 USIC 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
  - Model shows that the welfare loss from reclassification risk is increasing in pass-through from health risk to premiums
  - Estimate pass through coefficient as a "sufficient statistic" (Chetty, 2008, 2009; Einav et al. 2010)
  - We don't estimate structural model
- Evaluate reclassification risk by estimating pass-through from changes in health risk at an employer to changes in per-enrollee premiums
  - Our estimation controls for selection in and out of small group insurance
- We consider whether guaranteed renewability contracts with liquidity constraints can explain our findings
- We simulate counterfactuals with community rating and full experience rating

Relation to literature

- Paper builds on substantial literature that analyzes reclassification risk:
  - Buchmueller and DiNardo (2002) consider impact of community rating on adverse selection
  - Cutler and Reber (1998), Bundorf et al. (2012), Einav et al. (2010), and Kowalski (2015) study reclassification risk among employees with multiple plans at an employer
- And, guaranteed renewability contracts:
  - Pauly et al. (1995) discuss guaranteed renewability contracts in theory
  - Atal et al. (2019) analyze guaranteed renewability contracts in Germany
  - Ghili et al. (2019) consider optimal guaranteed renewability contracts with liquidity constraints
- Our unique data add value here
  - We can understand the extent of reclassification risk in the real world
  - We also test whether our findings can be explained by guaranteed renewability contracts

Remainder of talk

1. Model
2. Data
3. Empirical Approach
4. Results
5. Counterfactuals
6. Conclusion

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 a risk score, r_{ijt}
  - Score is observable based on lagged claims data
  - Leads to health shock H with distribution $dF_H(r_{ijt})$
  - 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, $p_{jt}(R_{jt})$
- 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:

$$U_{ij}^{A}(r_{ijt}, p_{jt}(R_{jt})) = \int u_{ij}\left[Y_{ijt} - p_{jt}(R_{jt}) - c^{oop}(H)\right] dF_H(r_{ijt})$$

    where c^{oop} is out-of-pocket costs
  - We assume that u_{ij} exhibits risk aversion
  - Enrollee pays full p_{jt} through premiums or wage changes
- Per-period utility from not obtaining insurance:

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

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

$$U_{ij}(r_{ijt}, p_{jt}(R_{jt})) = \max\left\{U_{ij}^{A}(r_{ijt}, p_{jt}(R_{jt})), U_{ij}^{N}(r_{ijt})\right\}$$

Discounted total value of potential enrollee

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

$$V(\vec{r}_{.j1}, i) = U_{ij}(r_{ij1}, p_{jt}(R_1)) + \delta \int U_{ij}(r_{ij2}, p_{jt}(R_{j2}))dF_{R,r}(R_{j2}, r_{ij2}|\vec{r}_{.j1})$$

  (where $\vec{r}_{.j1}$ is vector of individual risks and $dF_{R,r}(R_2, r_{i2}|\vec{r}_{.j1})$ 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:

$$V_{ij}(\vec{r}_{.j1}) = U_{ij}^{A}(\gamma R_{j1}) + \delta \int U^{A}(\gamma R_{j2}) dF_{R}(R_{j2}|\vec{r}_{.j1})$$

- 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):

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

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^A over break-even contracts
  - Competitive insurance industry with binding long-run contracts would have these contracts
- Long-run contracts are somewhat like community rating:
  - No pass through from health risk to premiums
  - However, initial premiums might vary based on employer characteristics

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 period t, e.g. from healthcare costs
- Note that if $\beta' < \tilde{\beta}$, then

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

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

How much pass through should we expect in our data?

- A competitive market where multi-period contracts are banned will have $\beta = \gamma$
- Insurers that can commit to multi-period contracts can create value with a high *c* and a low β
  - But, very difficult to enforce enrollee commitment to multi-period contracts
- One-sided commitment may have existed during our sample (Pauly and Lieberthal, 2008)
  - In these contracts, insurers commit but enrollees can lapse
  - Competitive insurance market with one-sided commitment will result in these commitment contracts (Harris and Holmström, 1982)
  - Optimal one-sided commitment (or guaranteed renewability) contracts have low β (Ghili et al., 2019)
- One-sided commitment contracts don't solve problem of new accounts
  - We would expect a higher β in cross-sectional regressions than in pass through regressions

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 period 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 period t are:

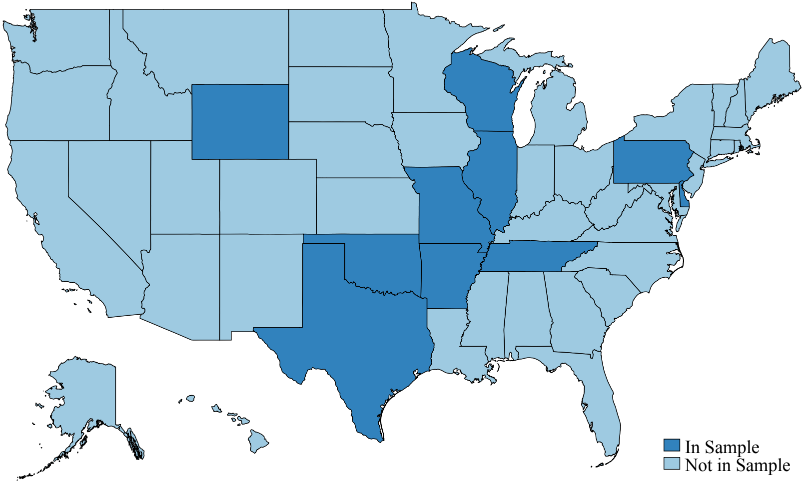
$$p_{ijt} = c_{jt} + \beta R_{jt} + \varepsilon^{p}_{ijt}$$

(where p is now indexed by 'i')
- We allow for correlations between $\vec{\varepsilon}^{s}_{it}$ and $\vec{\varepsilon}^{p}_{it}$
  - Expect negative correlation between premium and selection unobservables
- Our data contain premiums for potential enrollees who take up insurance
  - We use semi-parametric controls for selection

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 insurance premiums
  2. Individuals changing jobs for reasons orthogonal to insurance premiums
  3. Selection of health insurance based on insurance premiums
- There is selection based on risk: quitters are moderately more expensive
  - Suggests possibility of selection based on insurance premiums
  - Our estimates 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, employer size, and employer 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 changes in premiums on changes in 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:

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

- We perform regression just for 2014
- x_{jt} include 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

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

$$(\text{where } \varepsilon^p_{ijt} = g(S_{ijt}) + \varepsilon_{ijt})$$

- ★ 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 period t is individuals enrolled at period $t-1$
     - Variables in $f(\cdot)$: R_{jt}, r_{ijt}, industry, employer size, age, and gender
     - Lots of regressors but 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
     - See 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
  - Have employer fixed effects for treatment equation in main specifications
    - Identification of β based on changes in p_{jt} following changes in R_{jt}
- Inference
  - We adjust standard errors for two-step estimator and cluster two ways, employer and year

Impact of health risk on claims costs: γ

Table: Impact of risk on 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)
Employer 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 $t+1$.

- Employer risk R_{jt} predicts leaving USIC sample

Impact of health risk on premiums: β

Table: Impact of risk on 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: specifications with employer/enrollee fixed effects				
Health risk for enrolled, R_{jt}	188**	195***	663***	624***
	(87)	(82)	(132)	(121)
Panel B: specifications without employer/enrollee 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. Panel B includes market 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 results on β

- Across specifications, much less impact than full experience rating
  - 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 health risk, it also affects welfare

Robustness

1. Robustness to measurement error from risk score definition Evidence
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. Roll out of ACA regulations over time do not generate this slow pass through Table

Testing for guaranteed renewability contracts

- What might explain low pass through results?
  - Broadly consistent with Herring and Pauly (2006) and different from Gruber (2000)
  - Could results be driven by guaranteed renewability (GR) contracts?
- Ghili et al. (2019) model optimal GR contracts with liquidity constraints:
  - Insurers set premium schedules that incorporate some increases in premiums over time
  - Enrollees with relative drops in risk scores can obtain new insurance at lower rates
  - Insurers offer to renegotiate with these enrollees, to avoid lapsation and recontracting
- Why does this (partial) reclassification risk occur?
  - GR contracts have to balance risk protection against consumption smoothing
  - Only way to avoid this would be to front load premiums
  - But this would lead to underconsumption by the young

Testable implications of optimal GR model

1. Incomplete pass through from health risk to premiums, $0 < \beta < \gamma$
   - GR contracts add value because they lower reclassification risk
2. Groups with health risk increases face less reclassification risk than groups with health risk decreases
   - Groups with health risk decreases are the ones that renegotiate
3. Groups with high ex ante risk face more reclassification risk
   - They have a higher probability of a health risk drop

- We demonstrate that these implications hold in calibrated GR contracts from Handel et al. (2019)—an earlier version of Ghili et al. (2019) with more data reported
  - For implication 1, $\beta =$ \$1821 (\$410) in Handel et al.
- We then test for whether they hold in our data

Second implication of GR model

Table: Impact of risk on premiums using splines, with simulated guaranteed renewability data and USIC data

Panel A: specifications with enrollee fixed effects (N= 90,826)				
Dependent variable: change in annual employer mean premium, p_{jt}				
Sample:	HHW	USIC		
	(1)	(2)	(3)	(4)
Spline, $\Delta\ R_{jt} \leq 0$	3,612***	465***	752***	795***
	(88)	(82)	(99)	(30)
Spline, $\Delta\ R_{jt} > 0$	172***	-275***	12	44
	(26)	(71)	(85)	(29)
Polynomial Order		No	1^{st}	6^{th}
Panel B: specifications without enrollee fixed effects (N=181,652)				
Dependent variable: annual employer mean premium, p_{jt}				
Spline, $R_{jt} \leq 1$	2,973***	3,203***	3,669***	3,532***
	(742)	(136)	(126)	(123)
Spline, $R_{jt} > 1$	1,638***	1,887***	2,212***	2,480***
	(478)	(181)	(187)	(223)
Polynomial Order		No	1^{st}	6^{th}

Note: each observation is one enrollee for which we have a complete observation for years 2014 and 2015. Column (1) uses simulated data from [**?**]. In Columns (2) to (4), the dependent variable is the premium charged the employer by USIC divided by the number of covered lives. Markets are defined by USIC and roughly represent an MSA or state. All specifications include year fixed effects. We two-way cluster standard errors at the enrollee and year levels. *** 1% level, ** 5% level, and * 10% level.

- Consistent with implication 2, we observe more risk-based pricing when health risk drops

Third implication of GR model

Table: Impact of risk on premiums heterogeneity stratifying on initial risk

Panel A: specifications with enrollee fixed effects (N=90,826)				
Dependent variable: change in annual employer mean premium, p_{jt}				
Sample:	HHW	USIC		
	(1)	(2)	(3)	(4)
$1\{R_{j1} \leq 1\} \times \Delta R_{jt}$	279***	39	337***	378***
	(91)	(63)	(87)	(33)
$1\{R_{j1} > 1\} \times \Delta R_{jt}$	2,798***	65	346***	413***
	(491)	(64)	(87)	(27)
Polynomial Order		No	1^{st}	6^{th}
Panel B: specifications without enrollee fixed effects (N=181,652)				
Dependent variable: annual employer mean premium, p_{jt}				
$1\{R_{j1} \leq 1\} \times R_{jt}$	615***	1,313***	1,692***	1,978***
	(205)	(106)	(119)	(18)
$1\{R_{j1} > 1\} \times R_{jt}$	3,181***	2,002***	2,337***	2,554***
	(209)	(70)	(81)	(12)
Polynomial Order		No	1^{st}	6^{th}

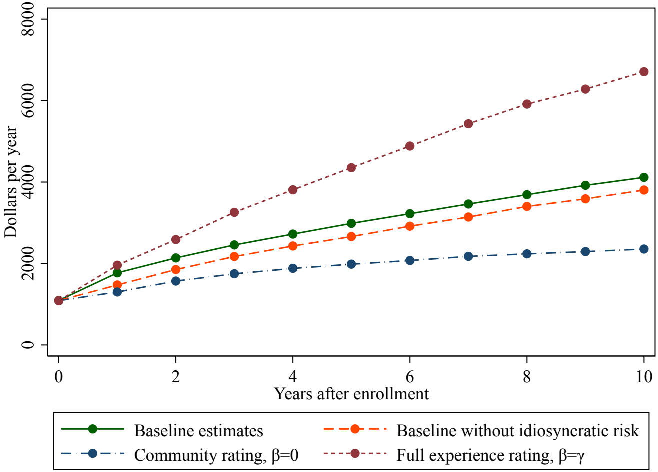
Note: each observation is one enrollee for which we have a complete observation for years 2014 and 2015. Column (1) uses simulated data from [?]. In Columns (2) to (4), the dependent variable is the premium charged the employer by USIC divided by the number of covered lives. Markets are defined by USIC and roughly represent an MSA or state. All specifications include year fixed effects. We two-way cluster standard errors at the enrollee and year levels. *** 1% level, ** 5% level, and * 10% level.

- Consistent with implication 3, we observe greater reclassification risk for ex-ante high risk individuals

Computation of counterfactuals

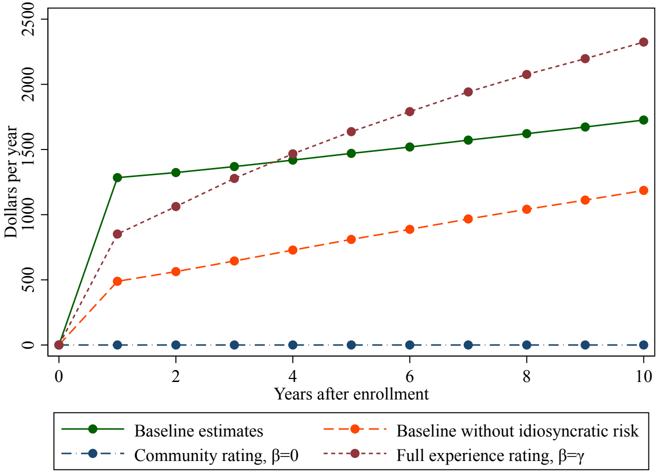
- Steps to counterfactual approach
  1. Non-parametrically construct 10 year path of r_{ijt} and R_{jt}
     - ★ We use risk model with two lags
  2. Evaluate how future risk distribution translates into future premium distribution and oop costs, under baseline and counterfactuals
     - ★ When individuals 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



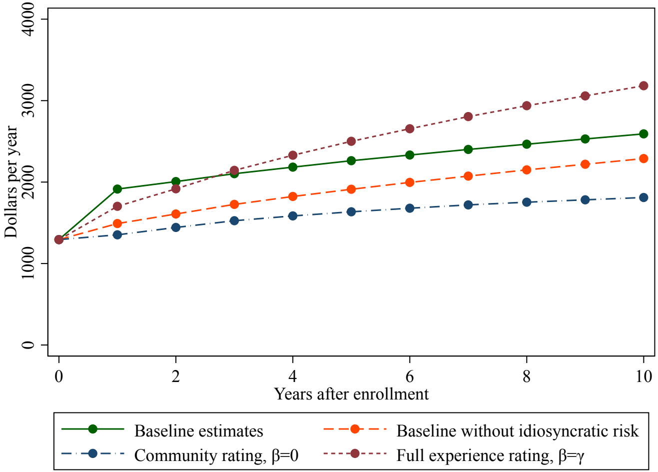
- USIC's pricing policy adds value relative to full experience rating
- Results similar but smaller with $\sigma = 0.00008$ Table

Mean standard deviation in premiums



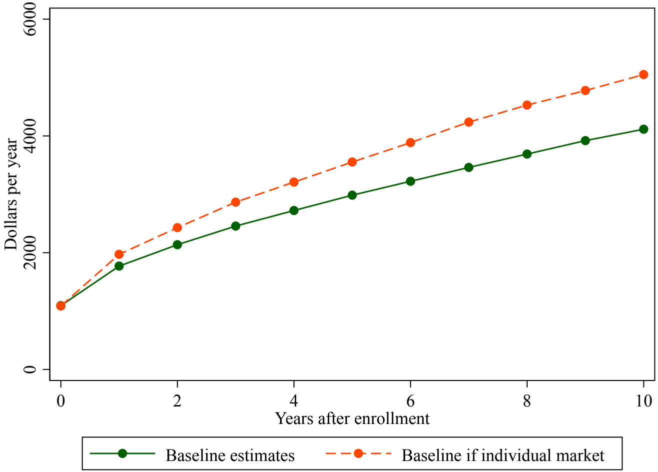
- Standard deviation of premiums largely from switchers

Mean standard deviation in health care expenditures



- OOP spending adds a lot of risk

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
  - Sample of 12,000 employers from period before ACA community rating regulations were effective
  - Researchers had very different priors on reclassification risk in this period
- We develop a simple two-period model of insurer pricing and offer/take-up
  - We estimate pass through from changes in health risk to changes in premiums, β
- We find $\beta/\gamma =$16% pass through from change in health risk to change in premiums
  - Results much larger without enrollee fixed effects
- Limited reclassification risk is consistent with USIC offering guaranteed renewability contracts
  - We test other implications of guaranteed renewability contracts and find that they hold
  - Most importantly, reclassification risk occurs on the downside and not on the upside
- Despite guaranteed renewability contracts, still substantial reclassification risk
  - High turnover of employees limits value from guaranteed renewability contracts
  - Nonetheless, USIC pricing policy added 60% of the difference in consumer welfare between experience rating and community rating

Appendix

With MEPS correction, impact of health risk on premiums: (β)

Table: Impact of risk on premiums with USIC sample correction

	Observation level:			
	Employer/year	Enrollee/year	Enrollee/year	Enrollee/year
	No selection correction		With selection correction	
	(1)	(2)	(3)	(4)
Panel A: specifications with employer/enrollee fixed effects				
Health risk for enrolled, R_{jt}	188**	195***	195	196
	(87)	(82)	(82)	(92)
Panel B: specifications without employer/enrollee 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 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. Panel B includes market 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: Impact of risk on 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: Impact of risk on 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: Impact of risk on 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: Impact of risk on premiums, with chronic conditions, panel A

Dependent Variable: Annual employer mean premium, p_{jt}					
Panel A: Effect controlling 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: Impact of risk on premiums, with chronic conditions, panel B

Dependent Variable: Annual employer mean premium, p_{jt}					
Panel B: Effect controlling 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: Impact of risk on benefits

	Dependent variable		
	In-network maximum OOP ($)	Coinsurance rate (%)	In-network deductible ($)
Regressor:	(1)	(2)	(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: Impact of risk on 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
   - 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:

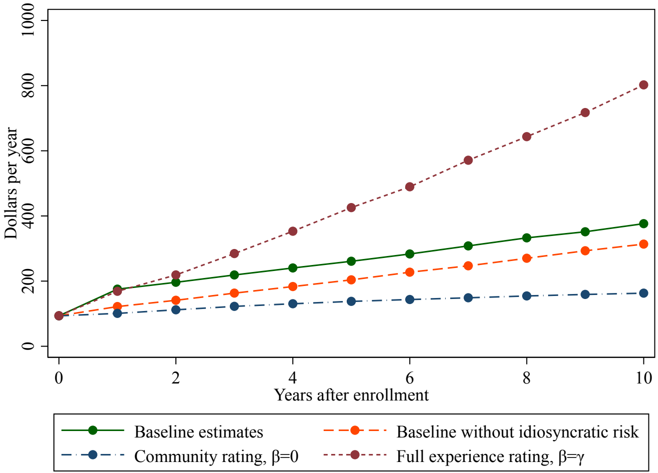
       $\sigma_{\omega\omega} = 0.22$ is the variance of the measurement error

       $\sigma_{RR} = 0.52$ 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 explains small part of pricing relative to full experience rating
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

return

Mean certainty equivalent income loss from risk



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