Health Consequences of Insurance Coverage

Health Economics
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1

Research question

- Research question: what does insurance status do for health?
- Why might help?
- Why not?
- What evidence have we seen to date?
- Problems for identification
  - insurance rates vary systematically across groups
  - People with poor health or more expected spending have higher demand for insurance
  - High socioeconomic status more likely to have insurance

2

MEPS, 18-64 Years of Age

Variable	Insured	Uninsured	Variable	Insured	Uninsured
Age	42.1	38.4	% Smoke	21.3%	28.4%
% Male	44.6%	50.4%	% w/ Phys. Limit.	11.9%	8.2%
% < HS	17.6%	43.0%	% diabetes	7.6%	5.2%
% College	27.0%	8.9%	% high chol	24.0%	11.4%
% Black	14.9%	14.0%	% high BP	24.3%	15.3%
% Hispanic	18.2%	47.7%	Dr. Visits	6.0	2.1
Fair/poor health	15.3%	17.0%	Hosp. Vis.	0.12	0.05
Fair/poor mental	7.7%	7.6%	Total $ HC	$3959	$1041

3

Results so Far

- RAND HIE
  - No difference in health outcomes for the average person
  - Some evidence high coinsurance plays were detrimental to people with pre-existing conditions
  - Problem – key outcomes are rare (like mortality) so the experiment does not have the statistical power to detect differences
- Oregon HIE
  - No change in health based on medical tests (cholesterol, blood pressure, glycated hemoglobin, BMI, etc.)
  - Improvements in self reported health , especially mental health – people think they are healthier
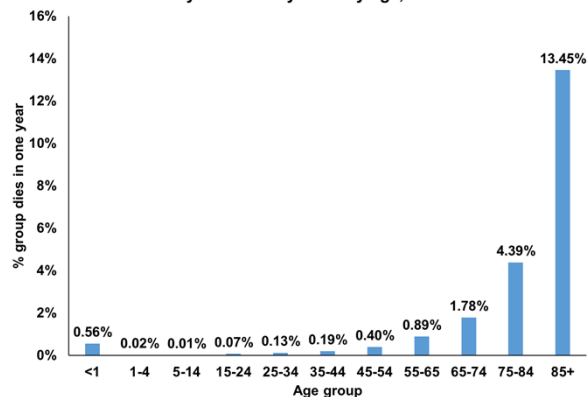
4

Problems in this literature

- Have a very predictive measure of health, self reported health status, that is hard to scale across people
- In many situations, have good objective measures of health, biomarkers, that don't seem to move
- One definitive outcome, mortality, that is very rare, even in 65-74 age group – need enormous samples to use this as an outcome

5

One year mortality rates by age, 2018

Age group	%
<1	0.56%
1-4	0.02%
5-14	0.01%
15-24	0.07%
25-34	0.13%
35-44	0.19%
45-54	0.40%
55-65	0.89%
65-74	1.78%
75-84	4.39%
85+	13.45%

Y-axis: % group dies in one year
X-axis: Age group

## Evidence from the start of Medicare

7

Medicare

- Health insurance for aged and disabled
- Become eligible when you turn 65
- Signed into law July 30, 1965 in Joplin, MO by President Johnson
- At the time, majority of the aged did not have insurance
- Rapid increase in insurance coverage for those 65+
- Think of as a difference-in-difference
  - Those aged 65+ are treatment
  - Near elderly are the control
  - Have data before/after age 65

8

2

Un-insurance rates

Age Group	1963	1970	1977
45-54	28%	18%	13%
55-64	28%	25%	13%
65-74	34%	2%	1%
75+	60%	4.6%	0.2%

9

Figure 2: Mortality Rate Trends by Age Group
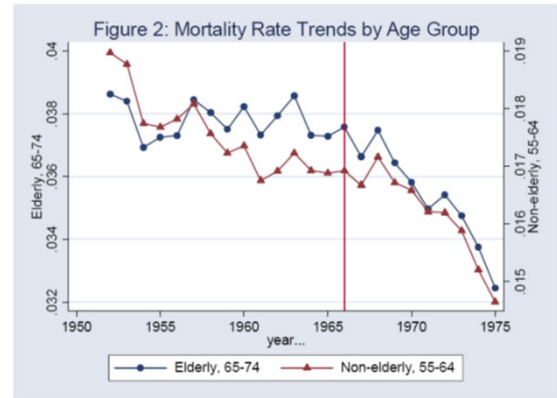
10

What might be wrong with this DnD model?

11

Affordable care act

- Passed March of 2010
- Mostly a bill to increase coverage
  – Expanding Medicaid
  – Established health ins. exchanges
  – Employer mandate
  – Individual mandate
- Different provisions introduced over time

12

Individual mandate

- Went into effect 2014
- Fines escalated over time
  - 2014: max of $95/person (up to 3) or 1% taxable income
  - 2015: max of $325/person (up to 3) or 2% of taxable income
  - 2016: max of $695/person (up to 3) or 3% of taxable income
- Has survived substantial constitutional challenge
  - Will talk about this the last week of October
- Fines set to $0 in 2019 by Tax Cut and Job Act of 2017

13

Goldin et al.

- In year 2015, 6.1 million returns were fined for not having health insurance
- Eliminate some
  - Those < 18 or >64
  - Multiple addresses
- Leaves 4.5 million returns, twice as many people

14

Goldin et al.

- Treasury selected 3.9 million housholds to receive notice in early 2016 – reminding them how to avoid a penalty
- Group was selected at random
- If pilot increases insurance holdoing coverage – can use to identify impact of insurance

15

16

Study

- Tax records merged to Social Security master death file

- Identifies date of death but not cause of death

- Key – SSN is used in both so easy linkage

17

Table 1: Summary Statistics and Balance Checks

	(1)	(2)	(3)	(4)	(5)	(6)
	All Taxpayers	No Full-Year Coverage	Experimental Sample			
			All	Treatment	Control	Difference p-value
Individual characteristics						
Female	0.511	0.478	0.451	0.450	0.451	0.669
Age	38.6	34.5	31.1	31.1	31.1	0.395
0 - 18	0.239	0.265	0.271	0.271	0.271	0.374
19 - 26	0.111	0.128	0.136	0.136	0.136	0.756
27 - 45	0.242	0.290	0.349	0.349	0.349	0.681
45 - 64	0.261	0.230	0.230	0.230	0.230	0.977
65 or older	0.147	0.087	0.015	0.015	0.014	0.510
Household characteristics						
Married	0.554	0.450	0.414	0.414	0.414	0.860
Household income	78,534	30,159	42,710	42,699	42,783	0.349
Income/Federal Poverty Line	4.16	1.61	2.35	2.35	2.36	0.523
< 1.38	0.366	0.657	0.267	0.267	0.266	0.143
1.38 - 4.00	0.276	0.228	0.629	0.629	0.630	0.429
≥ 4.00	0.358	0.115	0.104	0.103	0.104	0.313
Household size	2.81	2.86	2.74	2.74	2.74	0.725
Observations						
Individuals	2,893,655	45,472,192	8,897,821	7,651,401	1,246,420	
Households	1,398,008	22,778,960	4,526,719	3,892,849	633,870	

18

Figure 1: Coverage Rates by Month
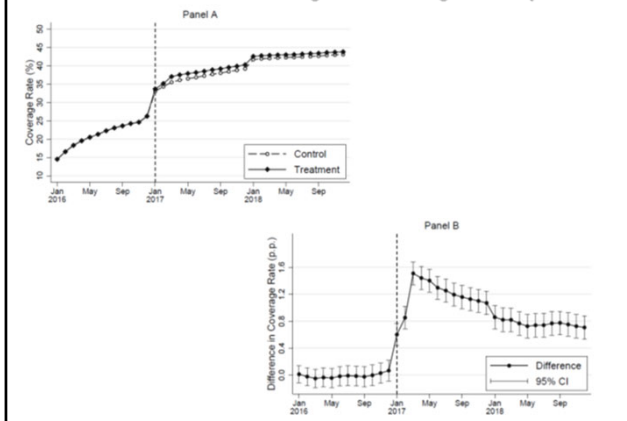
Figure 3: Mortality Over Time by Treatment Group

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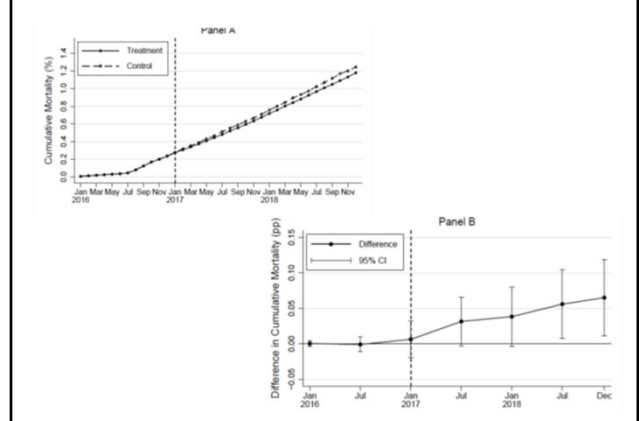
$$y_i = 1 \; if \; died$$
$$x_i = months \; of \; insurance$$
$$z_i = 1 \; if \; treated$$
$$first \; stage: x_i = \pi_0 + z_i \pi_1 + \mu_i$$
$$Intention \; to \; treat: y_i = \alpha_0 + z_i \alpha_1 + v_i$$
$$\pi_1 = dx / dz$$
$$\alpha_1 = dy / dz = (dx / dz)(dy / dx)$$
$$\alpha_1 / \pi_1 = dy / dx = Treatment \; on \; treated$$

21

Slide 22:

Table 7: Effect of Intervention on Mortality

	(1) Mortality	(2) Mortality (Controls)	(3) Prior-Year Mortality	(4) Mortality Among Prior-Year Insured
Treated	-0.063 (0.025)	-0.061 (0.025)	-0.002 (0.012)	-0.010 (0.037)
Control Mean	1.007	0.993	0.238	1.143
Observations	1,358,983	1,309,736	1,358,983	688,795

$$\alpha_1 = dy / dz$$

People in treatment group had .063 percentage points lower Mortality – mean mortality is 1 – so 6% lower mortality

22

Slide 23:

Table 8: Effect of Coverage on Mortality

	(1) Mortality (OLS)	(2) Covered Months (First Stage)	(3) Mortality (2SLS)	(4) Mortality (2SLS)	(5) Mortality (2SLS, no prior-year exclusion)
Covered Months	-0.026 (0.001)		-0.178 (0.070)	-0.166 (0.068)	-0.167 (0.068)
Treated		0.358 (0.026)			
Controls				×	×
Control mean	1.007	7.795	1.007	0.993	1.040
Observations	1,358,983	1,358,983	1,358,983	1,309,736	1,983,167

Intention to treat: -0.063
1st stage: 0.358
Treatment on treated: -0.063/0.358 = -0.176

23

Slide 24:

Doyle, RESTAT

- Examine outcomes of people involved in serious car crash
  - Taken away by ambulance
  - All receive some care
  - Question: what does insurance status do for quality of care?

- Why restrict to ambulance admits to the hospital?

24

6

CODES Data

- Crash Outcome Data Evaluation System
  - Links police accident reports to hospital discharge data
  - Only 23 states link (all payer states)

- Paper used data from WI, 1992-1997
  - 80% of all crash-related hospitalizations were linked

25

- Police report data
  - Driver characteristics (sex, seat location, belt use, insurance status)
  - Accident scene
  - Killed, incapacitating injury, non-incap injury
- Hospital data
  - Per discharge
  - Minimal demographics
  - Total charges and payer
  - Procedure use
  - Diagnostic characteristics

26

TABLE 1.—INSURED VERSUS UNINSURED: SELECTED VARIABLES

Variable		Privately Insured Mean	Privately Insured Std. Dev.	Uninsured Mean	Uninsured Std. Dev.	t
Treatment	Length of stay	9.17	13.93	6.44	8.30	7.56
	Facility charges ($1,000)	20.68	37.34	13.10	19.75	7.88
Outcome	Mortality	0.037	0.19	0.045	0.21	1.60
Personal characteristics	Female	0.38	0.49	0.28	0.45	7.24
	Restraint seat belt or child seat	0.30	0.46	0.19	0.39	9.59
Vehicle types	Car	0.61	0.49	0.60	0.49	0.53
	Motorcycle	0.14	0.35	0.15	0.36	1.20
	Vehicle weight: <2,420 lb	0.25	0.43	0.30	0.46	3.06
	Vehicle age: ≤4 years	0.28	0.45	0.19	0.39	5.71
Crash characteristics	Severe vehicle damage	0.49	0.50	0.48	0.50	0.98
	Trapped	0.17	0.38	0.15	0.36	2.34
	Head-on collision	0.13	0.33	0.12	0.32	1.12
	Angle collision	0.29	0.45	0.22	0.42	5.76
Road types	Urban street	0.20	0.40	0.22	0.42	2.12
	Rural street	0.36	0.48	0.39	0.49	1.75
	Rural highway	0.30	0.46	0.27	0.44	2.36
Day and hour	Weekend	0.53	0.50	0.56	0.50	2.53
	Between 11 p.m. and 7 a.m.	0.24	0.43	0.32	0.47	6.56
Major diagnostic categories	Nervous system	0.20	0.40	0.22	0.41	0.98
	Musculoskeletal and tissue	0.35	0.48	0.35	0.48	0.03
	Multiple significant trauma	0.20	0.40	0.16	0.37	3.16
Neighborhood characteristics	White	0.94	0.13	0.92	0.17	3.52
	Median household income	30,726	8,188	27,955	7,752	8.76
Observations		9,261		1,581		

Missing observations result in 6,668 observations for vehicle age; 6,113 for vehicle weight. The t-tests for neighborhood comparisons use standard errors clustered by ZIP code and 10,585 observations.

27

TABLE 2.—NO AUTO INSURANCE VERSUS NO HEALTH INSURANCE: SELECTED VARIABLES

Variable		Privately Insured with No Auto Ins. Mean	Privately Insured with No Auto Ins. Std. Dev.	No Health Insurance Mean	No Health Insurance Std. Dev.	t
Treatment	Length of stay	9.06	10.91	6.66	7.90	4.77
	Facility charges ($1,000)	21.03	32.85	14.60	22.65	4.29
Outcome	Mortality	0.019	0.14	0.036	0.19	2.05
Personal characteristics	Female	0.24	0.43	0.27	0.44	1.28
	Restraint (seat belt or child seat)	0.14	0.35	0.23	0.42	4.62
Vehicle types	Car	0.49	0.50	0.63	0.48	5.22
	Motorcycle	0.42	0.49	0.24	0.43	7.29
Road types	Urban street	0.23	0.42	0.17	0.38	2.80
	Rural highway	0.25	0.43	0.29	0.45	1.73
Day and hour	Weekend	0.60	0.49	0.57	0.50	1.09
	Between 11 p.m. and 7 a.m.	0.31	0.46	0.31	0.46	0.13
Major diagnostic categories	Nervous system	0.19	0.39	0.18	0.39	0.37
	Musculoskeletal and tissue	0.39	0.49	0.38	0.49	0.13
	Multiple significant trauma	0.17	0.38	0.16	0.37	0.66
Neighborhood characteristics	White	0.93	0.14	0.93	0.14	0.03
	Median household income	29,432	7,162	28,890	7,657	1.27
Driver indicators	At fault	0.71	0.45	0.77	0.42	2.36
	DUI alcohol	0.38	0.49	0.42	0.49	1.24
Observations		807		671		

Data are for drivers only.
The t-tests for neighborhood comparisons use standard errors clustered by ZIP code and 1,447 observations.

28

Slide 29

TABLE 3.—THE UNINSURED RECEIVE LESS TREATMENT THAN THE PRIVATELY INSURED

	ln(Facility Charges)				ln(Length of Stay)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Privately Insured versus Uninsured								
No health insurance	−0.273	−0.149	−0.137	−0.145	−0.238	−0.203	−0.170	−0.182
	(0.026)	(0.026)	(0.025)	(0.026)	(0.022)	(0.023)	(0.022)	(0.024)
HMO				−0.044				−0.028
				(0.026)				(0.022)
Full controls	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Hospital fixed effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Observations	10,840	10,840	10,840	9,861	10,842	10,842	10,842	9,863
R^2	0.24	0.25	0.39	0.39	0.15	0.12	0.23	0.23
B. Privately Insured with No Auto Insurance versus No Health Insurance								
No health insurance	−0.262	−0.178	−0.148	−0.155	−0.229	−0.218	−0.190	−0.191
	(0.053)	(0.055)	(0.053)	(0.061)	(0.045)	(0.046)	(0.046)	(0.052)
HMO				−0.051				−0.032
				(0.088)				(0.078)
Full controls	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Hospital fixed effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Observations	1,478	1,478	1,478	1,380	1,478	1,478	1,478	1,380
R^2	0.29	0.26	0.43	0.43	0.19	0.14	0.29	0.29

Full controls include all personal, vehicle, crash, road, and neighborhood characteristics, as well as hour-of-day, day-of-the-week, and year indicators. Robust standard errors in parentheses.

Slide 30

TABLE 4.—THE UNINSURED HAVE HIGHER MORTALITY

	Mortality			
	(1)	(2)	(3)	(4)
A. Privately Insured versus Uninsured				
No health insurance	0.012	0.013	0.015	0.016
	(0.006)	(0.006)	(0.006)	(0.006)
HMO				−0.002
				(0.005)
Full controls	Yes	No	Yes	Yes
Hospital fixed effects	No	Yes	Yes	Yes
Observations	10842	10842	10842	9863
R^2	0.06	0.03	0.07	0.07
B. Privately Insured with No Auto Insurance versus No Health Insurance				
No health insurance	0.016	0.022	0.017	0.020
	(0.009)	(0.009)	(0.009)	(0.010)
HMO				0.001
				(0.012)
Full controls	Yes	No	Yes	Yes
Hospital fixed effects	No	Yes	Yes	Yes
Observations	1478	1478	1478	1380
R^2	0.12	0.05	0.15	0.16

Full controls include all personal, vehicle, crash, road, and neighborhood characteristics, as well as hour-of-the-day, day-of-the-week, and year indicators. Robust standard errors in parentheses.
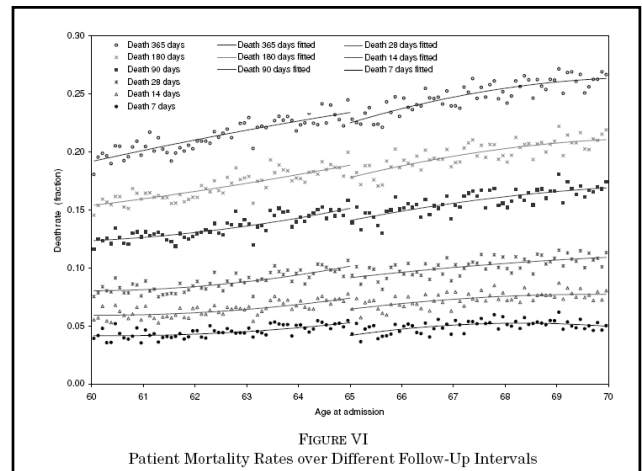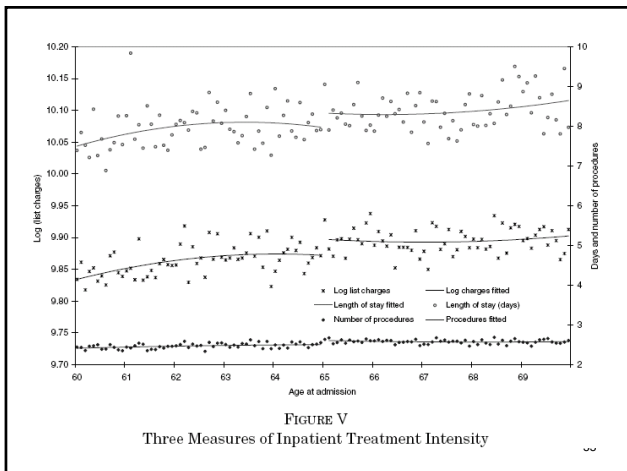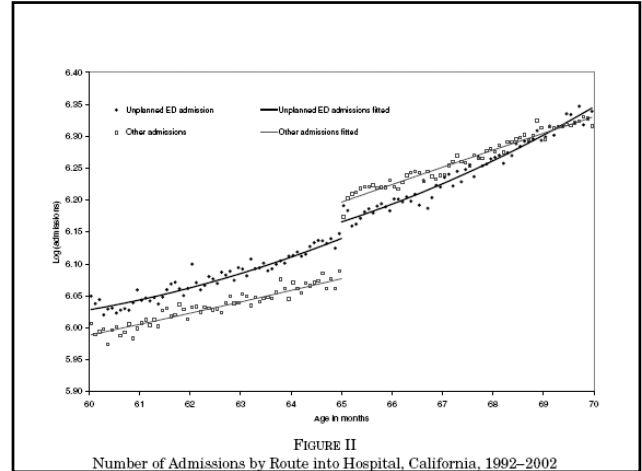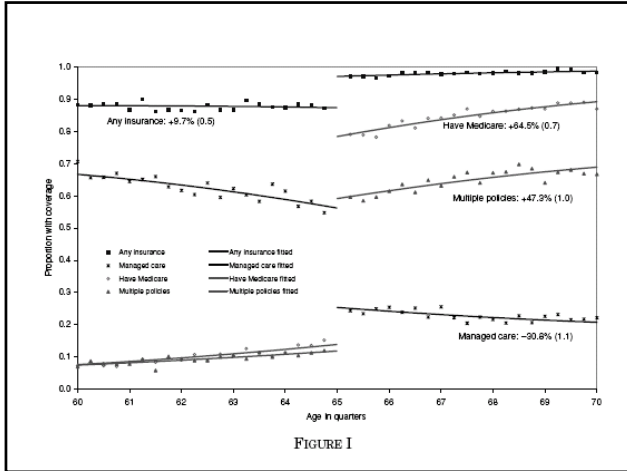
Slide 31

Card et al, *QJE*

Slide 32

Sample

- CA hospital admissions 1992-2002

- Restrict sample to those admitted through emergency department
  - e.g., Chronic bronchitis, heart attack, stroke
  - Why?

FIGURE I

FIGURE II
Number of Admissions by Route into Hospital, California, 1992–2002

FIGURE V
Three Measures of Inpatient Treatment Intensity

FIGURE VI
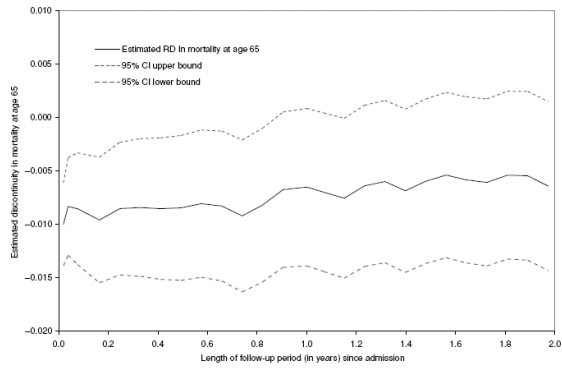Patient Mortality Rates over Different Follow-Up Intervals

9

FIGURE VII
Estimates of the Discontinuity in Mortality Rates at Age 65 over Various
Follow-Up Periods

37

10