Health Insurance and the Demand for Care: Four Decades of Research

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Outline of Points

- The no-insurance vs some-insurance margin: The Oregon Health Insurance Experiment and other studies
- The generosity-of-insurance margin: The RAND Health Insurance Experiment
- Value-based insurance designs

The Oregon HIE: Policy Context

- For decades many have argued that being uninsured is causally bad for your health*
- But there are dissenters; some on the right argued that the uninsured got care anyway for a nominal price; some even argued Medicaid was worse than being uninsured**
- Part of the reason this debate continued was the lack of a randomized study

*See for example the Institute of Medicine monograph series Insuring Health, 2001-2003.
**http://online.wsj.com/article/SB10001424052748704758904576188280858303612.html

The Oregon HIE – Design and Analysis

- In 2008 Oregon conducted a lottery to enroll 100,000 then uninsured adults with no dependent children in its Medicaid program*
- Of those who won the lottery, only about a quarter ultimately enrolled in Medicaid;** the following tables assume the effects were entirely in that group
  - Statistically, winning the lottery was used as an instrumental variable

*See Finkelstein, et al., Quarterly Journal of Economics, August 2012, and Baicker, et al., NEJM, May 2, 2013.
**About 40% did not return forms to establish eligibility; most of the remainder were ineligible for Medicaid.

Gaining Medicaid Reduced Financial Hardship*

Table 4. Mean Values and Absolute Change in Financial Hardship with Medicaid Coverage.*

Variable	Mean Value in Control Group	Change with Medicaid Coverage (95% CI)†	P Value
Any out-of-pocket spending (%)	58.8	−15.30 (−23.28 to −7.32)	<0.001
Amount of out-of-pocket spending ($)	552.8±1219.5	−215.35 (−408.75 to −21.95)	0.03
Catastrophic expenditures (%)‡	5.5	−4.48 (−8.26 to −0.69)	0.02
Any medical debt (%)	56.8	−13.28 (−21.59 to −4.96)	0.002
Borrowed money to pay bills or skipped payment (%)	24.4	−14.22 (−21.02 to −7.43)	<0.001

* Plus–minus values are weighted means ±SD. Where means are shown without standard deviations, they are weighted means. The effect of Medicaid coverage was estimated with the use of two-stage least-squares instrumental-variable regression. All regressions include indicators for the number of household members on the lottery list, and all standard errors were clustered on household. All analyses were weighted with the use of survey weights. The sample was all 12,229 survey respondents.
† For variables measured as percentages, the change is expressed as percentage points.
‡ Persons with catastrophic expenditures had out-of-pocket medical expenses that exceeded 30% of their household income.

Those with out-of-pocket > 30% of income fell from 5.5% to 1.0%.

*Baicker, et al., NEJM, May 2, 2013. p values are corrected for multiple comparisons.

Large Reduction in Depression*

Variable	Mean Value in Control Group	Change with Medicaid Coverage (95% CI)†	P Value
Depression			
Positive screening result (%)‡‡	30.0	−9.15 (−16.70 to −1.60)	0.02
Diagnosis after lottery (%)§¶	4.8	3.81 (0.15 to 7.46)	0.04
Current use of medication for depression (%)§‖	16.8	5.49 (−0.46 to 11.45)	0.07

Positive screen is score of ≥ 10 on PHQ-8 (range 0-24); diagnosis is self-reported

*Source: Baicker, et al., NEJM, May 2, 2013. p values are corrected for multiple comparisons.

Large Increases in DM Dx and Medication, No Effect on Hba1c*

Variable	Mean Value in Control Group	Change with Medicaid Coverage (95% CI)†	P Value
Glycated hemoglobin			
Level (%)	5.3±0.6	0.01 (−0.09 to 0.11)	0.82
Level ≥6.5% (%)††	5.1	−0.93 (−4.44 to 2.59)	0.61
Diabetes			
Diagnosis after lottery (%)§¶	1.1	3.83 (1.93 to 5.73)	<0.001
Current use of medication for diabetes (%)§‖	6.4	5.43 (1.39 to 9.48)	0.008

No observed effects on hypertension or hypercholesterolemia

*Source: Baicker, et al., NEJM, May 2, 2013. p values are corrected for multiple comparisons.

Medicaid Improved Self-Rated Health*

Table 3. Mean Values and Absolute Change in Health-Related Quality of Life and Happiness with Medicaid Coverage.*

Variable	Mean Value in Control Group	Change with Medicaid Coverage (95% CI)†	P Value
Health-related quality of life			
Health same or better vs. 1 yr earlier (%)	80.4	7.84 (1.45 to 14.23)	0.02
SF-8 subscale‡			
Mental-component score	44.4±11.4	1.95 (0.03 to 3.88)	0.05
Physical-component score	45.5±10.5	1.20 (−0.54 to 2.93)	0.18
No pain or very mild pain (%)	56.4	1.16 (−6.94 to 9.26)	0.78
Very happy or pretty happy (%)	74.9	1.18 (−5.85 to 8.21)	0.74

* Plus–minus values are weighted means ±SD. Where means are shown without standard deviations, they are weighted means. The effect of Medicaid coverage was estimated with the use of two-stage least-squares instrumental-variable regression. All regressions included indicators for the number of household members on the lottery list, and all standard errors were clustered on household. All analyses were weighted with the use of survey weights. The sample was all 12,229 survey respondents.
† For variables measured as percentages, the change is expressed as percentage points.
‡ Scores on the Medical Outcomes Study 8-Item Short-Form Health Survey (SF-8) range from 0 to 100, with higher subscale scores indicating better self-reported health-related quality of life. The scale is normalized to yield a mean of 50 and a standard deviation of 10 in the general U.S. population.

*Source: Baicker, et al., NEJM, May 2, 2013. p values are corrected for multiple comparisons.

My Interpretation of Oregon

- Insurance did what it is supposed to do, namely reduce the financial strain of illness
- As for health outcomes, there was a favorable effect on depression
- Observational studies mostly show favorable effects from the uninsured gaining Medicaid coverage; see Sommers, et al. for a review*

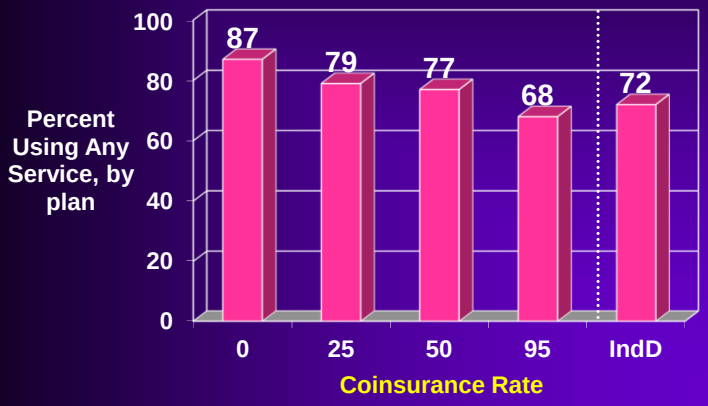
*Sommers, et al., NEJM August 10, 2017. Black, et al., AJHE Summer 2017, however, find little or no effect on mortality.

Conditional on Insurance, Does Generosity Matter?*

- Four decades ago the RAND Experiment randomized non-elderly participants to different coinsurance rates, 0, 25%, 50%, 95%; all policies had a stop-loss feature
  - One policy ("IndD") applied a $150 individual deductible to outpatient services only
- Generosity mattered as shown in the next four slides

*Newhouse, et al., Free for All, Harvard University Press, 1993.

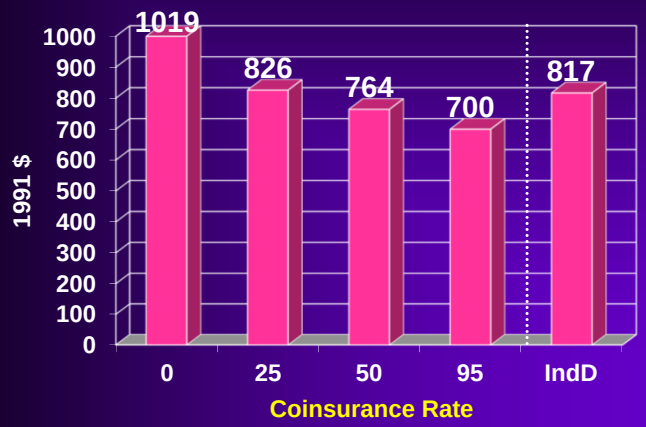
Likelihood of Any Use, by Plan



25, 50, 95 plans have $1,000 stop loss, late 1970s $

S.e.'s:0.8,1.4,2.3,1.8,1.5. Chi-square(4) 145, p<.00001. IndD has cost sharing only for outpatient.

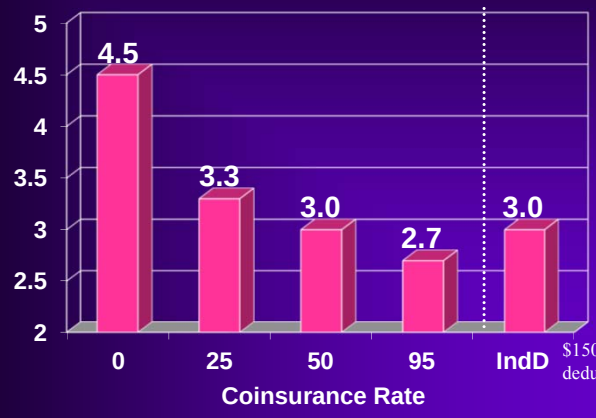
Total Spending/Person, by Plan



25, 50, 95 plans have $1,000 stop loss, late 1970s $

Predicted means in 1991 dollars. t's vs free: -4.1,-4.9, -6.7, -3.8. IndD has cost sharing only for outpatient.

Per Person per Year Visit Rates, by Plan

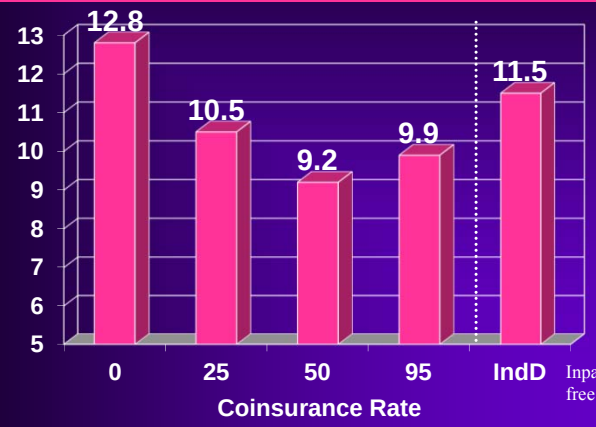


$150 individual deductible on this plan

25, 50, 95 plans have $1,000 stop loss, late 1970s $

Face-to-face visits (excludes Radiologists, Anesthesiologists, Pathologists). S.e.'s all = 0.2. Chi-square(4): 69, p < 0.000001. IndD plan has cost sharing only for outpatient.

Admission Rates by Plan (/100)



Inpatient services were free on this plan

25, 50, 95 plans have $1,000 stop loss, late 1970s $

S.e.'s: 0.45,0.61,0.77,0.55,0.55. Chi-square(4): 19.5, p=0.0006.

The Average Adult: Little Effect Except for Blood Pressure, Vision*

Table 5. Predicted Exit Values of Health-Status Measures for an Average Person According to Measure and Plan, and Raw Mean Difference.

Health-Status Measures	No. *	Cost-Sharing Plans				Free Plan	Predicted Mean Difference (free minus cost-sharing) †	Raw Mean Difference (free minus cost-sharing)
		Catastrophic	Intermediate	Individual Deductible	Total			
General health (score, 1–100)								
Physical functioning	3862	86.0	85.0	84.9	85.3	85.3	0.0 (−1.6, 1.5)	−0.3 (−2.3, 1.7)
Role functioning	3861	95.5	95.0	94.7	95.1	95.4	0.3 (−0.6, 1.2)	−0.3 (−2.2, 1.6)
Mental health	3862	75.6	75.5	75.8	75.6	75.5	−0.2 (−1.1, 0.8)	−0.1 (−1.1, 1.0)
Social contacts	3827	69.3	70.2	69.8	69.8	69.4	−0.3 (−2.3, 1.6)	−0.2 (−2.4, 2.0)
Health perceptions	3843	68.1	68.0	67.9	68.0	67.4	−0.6 (−1.5, 0.3)	−0.9 (−2.1, 0.3)
Health habits								
Smoking (scale, 1–2.20)	3758	1.28	1.29	1.29	1.29	1.29	0.0 (−0.02, 0.02)	−0.00 (−0.03, 0.03)
Weight (kg)	2804	72.8	72.6	73.1	72.8	72.8	0 (−0.5, 0.5)	0.0 (−1.0, 1.0)
Cholesterol level (mg/dl)	3381	202	200	204	202	203	1.0 (−1, 3)	1 (−2, 4)
Physiologic health								
Diastolic blood pressure (mm Hg)	3232	79.2	79.1	79.3	79.2	78.5	−0.7 (−1.5, 0.02) ‡	−0.8 § (−1.7, −0.02)
Functional far vision (no. of Snellen lines)	3477	2.55	2.50	2.51	2.52	2.42	−0.1 (−0.16, −0.04) ¶	−0.13 (−0.20, −0.06)
Risk of dying (score)	3317	1.01	0.98	1.03	1.01	0.99	−0.02 (−0.05, 0.02)	−0.03 (−0.07, 0.02)

*Source: Brook, et al., NEJM, December 8, 1983. Snellen line of 2.0 = 20/20 vision.

Larger Effects Among the Most Disadvantaged 6%*

Table 8. Differences between Free and Cost-Sharing Plans in Predicted Exit Values of Blood Pressure and Vision and the Risk of Dying, According to Initial Health Status and Income.

Physiologic Measures	Elevated Risk *	
	Low Income	High Income
Diastolic blood pressure	−3.3 (−5.9, −0.7)	−0.4 (−2.6, 1.8)
Functional far vision	−0.3 (−0.6, +0.02)	−0.1 (−0.4, 0.2)
Risk of dying	−0.30 (−0.60, −0.04)	−0.13 (−0.40, 0.10)

The change in predicted risk of death is around 15% for the low income at elevated risk comparing the free plan with all other plans combined.

*Most disadvantaged: Among lowest 20% of both health measure and income. Source: Brook et al., NEJM, December 8, 1983

Why Did RAND Find an Effect and Oregon Did Not?

- A seeming paradox because Oregon had a considerably larger sample and, if anything, the true effect should have been larger in a Medicaid eligible population

The Power Issue Has Been Picked Up in the ACA Debate*

In parallel fashion, I did a deep dive comparing the OHIE to the RAND Health Insurance Experiment, pointing out that the OHIE effectively had a Medicaid sample size roughly 2-1/2 times the size of the RAND HIE, yet the latter study was able to find some statistically significant results regarding low blood pressure:

- For those who began the experiment with high blood pressure (the 20% having the highest diastolic blood pressure), free care plan participants had a clinically significant decline in blood pressure compared to their counterparts in cost-sharing plans.
- Epidemiologic data imply that a reduction of this magnitude would lower mortality about 10% a year in the free care group (the sample size was too small to actually measure this mortality reduction among HIE participants).

For the foregoing analysis, I was only counting the 1,903 who actually enrolled in Medicaid in the OHIE and comparing this to the estimated 850 person-years of coverage in the RAND HIE for low-income adults. But Richardson et al. have pointed out that the OHIE study's reported effective sample sizes given survey weighting were 5,406 treatments (i.e., Medicaid) and 4,786 controls. So if OHIE was underpowered, it is truly puzzling how the RAND HIE was able to obtain significant results even with a sample size that was many times smaller.

*The author is Chris Conover. https://www.forbes.com/sites/theapothecary/2017/06/30/reality-check-the-obamacare-medicaid-expansion-is-not-saving-lives-part-i/#315e5b40100a

The Likely Answer

- RAND had a baseline measure for 60% of participants and biomarkers tend to be stable over a few years absent medical intervention; Oregon had no baseline measure so lacked power

A More Nuanced Picture of Cost Sharing

- Cost sharing in RAND reduced both appropriate (meaning care thought to be efficacious) care and inappropriate care, so why were there no health outcome effects?
  - Errors/noise in measuring outcomes?
  - Errors/noise in measuring appropriate care?
  - Negative effects of inappropriate care?

A Quality of Care Story?

- Various literatures documenting quality of care deficiencies make offsetting effects plausible to me
  - The geographic variation literature*
  - The appropriateness and adherence to guideline literature**
  - The errors literature***
- Of course, if quality of care has sufficiently improved, results might differ today

*Fisher, et al., Annals of Internal Medicine, February 18, 2003. **McGlynn, et al., NEJM, June 26, 2003.
***Institute of Medicine, To Err Is Human, 1999.

What if RAND Were Rerun Today?

- The ACA has improved access, but one can ask: Access to what?
- Since RAND, quality has improved on some measures, but has been reasonably constant on others such as the Prevention Quality Indicator Composite and the Inpatient Quality Indicator Composite
- Improved quality is still an urgent task

Value-Based Insurance Design

- RAND showed cost sharing reduced both appropriate and inappropriate care
- Value-based insurance design, meaning no cost sharing for appropriate services, is intended to address the effect on appropriate care*

*See Chernew, et al., Health Affairs, 2008.

Value-Based Insurance Design Has Been Slow to Spread

- Defining appropriate services for the purposes of an insurance contract, however, is not straightforward
- And in a randomized trial value-based insurance design for post-myocardial infarction patients did not save money though it may have led to marginally better health outcomes (next slide)*

*Source: Choudhry, et al., NEJM, December 1, 2011

Value-Based Insurance Design Has Been Slow, cont.

- Making statins, beta-blockers, ACE inhibitors, and ARB's free to post-MI patients only increased adherence 4 to 6 percentage points on a baseline of 36 to 49% adherence*
  - Even if health outcome effects are small, however, there is a gain in risk reduction
- More experiments like this would be useful

*Source: Choudhry, et al., NEJM, December 1, 2011.

Conclusions

- There are very likely beneficial health effects from being insured, and there is certainly a reduction in financial hardship if the insurance has a stop-loss feature
- Less cost sharing increases use
- Except for low-income patients with chronic disease, less cost sharing in a general, non-elderly population appears to have offsetting effects on health