Findings from the Oregon Health Insurance Experiment: Lessons for State Medicaid Expansions

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Fortuitous Timing

- What are the effects of expanding access to public health insurance for low income adults?
  - Magnitudes (and even signs) uncertain

- Limited existing evidence
  - IOM review of evidence – suggestive, but much uncertainty
  - Observational studies confounded by selection into HI
  - Quasi-experimental work often focuses on elderly and kids
  - Only one RCT in a developed country: Rand HIE
    - 1970s experiment on a general population
    - Randomized cost-sharing, not coverage itself
The Oregon Health Insurance Experiment

Setting: OHP Standard

- Oregon’s Medicaid expansion program for poor adults
- Eligibility
  - Poor (<100% FPL) adults 19-64
  - Not eligible for other programs
  - Uninsured>6 months
  - Legal residents, . . . .
- Comprehensive coverage (no dental or vision)
- Minimum cost-sharing
- Similar to other states in payments, management (though changing)
- Closed to new enrollment in 2004
The Oregon Medicaid Experiment

Lottery
- Waiver to operate lottery
- 5-week sign-up period, heavy advertising (Jan-Feb 2008)
- Low barriers to sign-up, no eligibility pre-screening
- Limited information on list
- Randomly drew 30,000 out of 85,000 on list (March-Oct 2008)
- Those selected given chance to apply
  - Treatment at household level
  - Had to return application within 45 days
  - 60% applied; 50% of those deemed eligible → 10,000 enrollees
The Oregon Health Insurance Experiment

- Evaluate effects of Medicaid using lottery as RCT
  - ITT: Reduced form comparison of outcomes between treatment group (selected by lottery) and controls (not selected)
  - ToT: IV using lottery as instrument for insurance coverage
  - Massive data collection effort – primary and secondary

- Broad Questions:
  - Costs: Health care utilization
  - Benefits I: Financial risk exposure
  - Benefits II: Health
Data

- Pre-randomization demographic information
  - From lottery sign-up

- State administrative records on Medicaid enrollment
  - Primary measure of first stage (insurance coverage)

- Outcomes
  - Administrative data (~16 months post-notification)
    - Hospital discharge data, mortality, credit reports
  - Mail surveys (~15 months)
    - Some questions ask 6-month look-back, some current
  - In-person survey and measurements (~25 months)
    - Detailed questionnaires, blood samples, BP, BMI
Sample

- 89,824 unique individuals on the list
- Sample exclusions (based on pre-randomization data ONLY)
  - Ineligible for OHP Standard (out of state address, age, etc)
  - Individuals with institutional addresses on list
- Lottery list only pre-randomization non-admin data
- Final sample: 74,922 individuals (66,385 households)
  - 29,834 treated individuals (surveyed 29,589)
  - 45,088 control individuals (surveyed 28,816)
Study Population

Lottery List
Distribution Across Zip Codes
## Sample Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Variable</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: Full sample</strong></td>
<td></td>
<td><strong>Panel B: Survey responders only</strong></td>
<td></td>
</tr>
<tr>
<td>%Female</td>
<td>0.56</td>
<td>Average Age</td>
<td>41</td>
</tr>
<tr>
<td>%White</td>
<td>0.82</td>
<td>Diabetes</td>
<td>0.18</td>
</tr>
<tr>
<td>%Black</td>
<td>0.04</td>
<td>Asthma</td>
<td>0.28</td>
</tr>
<tr>
<td>% Spanish/Hispanic/Latino</td>
<td>0.12</td>
<td>High Blood Pressure</td>
<td>0.40</td>
</tr>
<tr>
<td>% High school or less</td>
<td>0.67</td>
<td>Emphysema or Chronic Bronchitis</td>
<td>0.13</td>
</tr>
<tr>
<td>% don't currently work</td>
<td>0.55</td>
<td>Depression</td>
<td>0.56</td>
</tr>
<tr>
<td>Determinants of eligibility:</td>
<td></td>
<td>Health Status: Ever diagnosed with:</td>
<td></td>
</tr>
<tr>
<td>Average hh income (2008)</td>
<td>13,050</td>
<td>% with any insurance</td>
<td>0.33</td>
</tr>
<tr>
<td>% below Federal poverty line</td>
<td>0.68</td>
<td>% with private insurance</td>
<td>0.13</td>
</tr>
</tbody>
</table>
Study Population

Credit Report Sample (n=49,980)

Mail Survey Sample (n=58,405)

Mail Survey Responders (n=23,741)

Study Population (n=74,922)
  = Hospital Discharge and Mortality Sample

Original Lottery List (n=89,824)
Closer Look: Administrative Data

- **Medicaid records**
  - Pre-randomization demographics from list
  - Enrollment records to assess “first stage” (how many of the selected got insurance coverage)

- **Hospital Discharge Data 2007-2010**
  - Probabilistically matched to list, de-identified at OHPR
  - Includes dates and source of admissions, diagnoses, procedures, length of stay, hospital identifier
  - Includes years before and after randomization

- **Other Data 2007-2010**
  - Mortality data from Oregon death records
  - Credit report data, probabilistically matched, de-identified
Closer Look: Mail Survey Data

- **Fielding Protocol**
  - ~70,000 people, surveyed at baseline & 12 months later
  - Basic protocol: Three-stage mail survey protocol, English/Spanish
  - Intensive protocol on a 30% subsample included additional tracking, mailings, phone attempts
    - Done to adjust for non-response bias

- **Response Rate**
  - Effective response rate=50%
  - Non-response bias always possible, but response rate and pre-randomization measures in admin data were balanced between treatment & control
Closer Look: In-Person Data Collection

**Questionnaire and health examination** including
- Survey questions
- Anthropometric and blood pressure measurement
- Dried blood spot collection
- Catalog of all medications

- Fielded between September 2009 and December 2010
  - Average response ~25 months after lottery began
- Limited to Portland area: 20,745-person sample
- 12,229 interviews for effective response rate of 73%
Empirical Framework

- Reduced form – effect of lottery selection
  \[ y_{ij} = \beta_0 + \beta_1 LOTTERY_{ih} + X_{ih} \beta_2 + V_{ih} \beta_3 + \varepsilon_{ih} \]
  - Validity of experimental design: real randomization; balance on T and C (especially surveys)

- IV – effect of insurance coverage
  \[ INSURANCE_{ij} = \delta_0 + \delta_1 LOTTERY_{ih} + X_{ih} \delta_2 + V_{ih} \delta_3 + \mu_{ij} \]
  \[ y_{ij} = \pi_0 + \pi_1 INSURANCE_{ih} + X_{ih} \pi_2 + V_{ih} \pi_3 + \nu_{ij} \]
  - Effect of lottery on coverage: about 25 percentage points
  - Additional assumption for causality: primary pathway
    - Could affect participation in other programs, but actually small
    - “Warm glow” of winning – especially early

- Analysis plan, multiple inference adjustment
### Effects of Lottery on Coverage (1st Stage)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Full sample</th>
<th></th>
<th>Credit subsample</th>
<th></th>
<th>Survey respondents</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Estimated FS</td>
<td>Control</td>
<td>Estimated FS</td>
<td>Control</td>
<td>Estimated FS</td>
</tr>
<tr>
<td>Ever on Medicaid</td>
<td>0.141</td>
<td>0.256</td>
<td>0.135</td>
<td>0.255</td>
<td>0.135</td>
<td>0.290</td>
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<td></td>
<td>(0.004)</td>
<td>(0.004)</td>
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<td>(0.007)</td>
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<tr>
<td>Ever on OHP Standard</td>
<td>0.027</td>
<td>0.264</td>
<td>0.028</td>
<td>0.264</td>
<td>0.026</td>
<td>0.302</td>
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<td></td>
<td>(0.003)</td>
<td>(0.004)</td>
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<td>(0.005)</td>
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</tr>
<tr>
<td># of Months on Medicaid</td>
<td>1.408</td>
<td>3.355</td>
<td>1.352</td>
<td>3.366</td>
<td>1.509</td>
<td>3.943</td>
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<tr>
<td></td>
<td>(0.045)</td>
<td>(0.055)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>On Medicaid, end of study period</td>
<td>0.106</td>
<td>0.148</td>
<td>0.101</td>
<td>0.151</td>
<td>0.105</td>
<td>0.189</td>
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<tr>
<td></td>
<td>(0.003)</td>
<td>(0.004)</td>
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<tr>
<td>Currently have any insurance (self report)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.325</td>
<td>0.179</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.008)</td>
<td></td>
</tr>
<tr>
<td>Currently have private ins. (self report)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.128</td>
<td>-0.008</td>
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<td></td>
<td></td>
<td></td>
<td>(0.005)</td>
<td></td>
</tr>
<tr>
<td>Currently on Medicaid (self report)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.117</td>
<td>0.197</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.006)</td>
<td></td>
</tr>
<tr>
<td>Currently on Medicaid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.093</td>
<td>0.177</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.006)</td>
<td></td>
</tr>
</tbody>
</table>
Outcomes

- **Access & Use of Care**
  - Is access to care improved? Do the insured use more care? Is there a shift in the types of care being used?
  - Mail surveys and hospital discharge data

- **Financial Strain**
  - How much does insurance protect against financial strain? What are the out-of-pocket cost implications?
  - Mail surveys and credit reports

- **Health**
  - What are the short-term impacts on physical & mental health?
    - Mail surveys (self-report)
    - In-person health screenings (self-report + biomarkers)
    - Vital statistics (mortality)
### Results: Access & Use of Care

Gaining insurance resulted in better access to care and higher satisfaction with care (conditional on actually getting care).

<table>
<thead>
<tr>
<th></th>
<th>CONTROL</th>
<th>RF Model (ITT)</th>
<th>IV Model (ToT)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have a usual place of care</td>
<td>49.9%</td>
<td>+9.9%</td>
<td>+33.9%</td>
<td>.0001</td>
</tr>
<tr>
<td>Have a personal doctor</td>
<td>49.0%</td>
<td>+8.1%</td>
<td>+28.0%</td>
<td>.0001</td>
</tr>
<tr>
<td>Got all needed health care</td>
<td>68.4%</td>
<td>+6.9%</td>
<td>+23.9%</td>
<td>.0001</td>
</tr>
<tr>
<td>Got all needed prescriptions</td>
<td>76.5%</td>
<td>+5.6%</td>
<td>+19.5%</td>
<td>.0001</td>
</tr>
<tr>
<td>Satisfied with quality of care</td>
<td>70.8%</td>
<td>+4.3%</td>
<td>+14.2%</td>
<td>.001</td>
</tr>
</tbody>
</table>

**SOURCE:** Mail Survey Data
Preventive Care
Mail Survey Data

- Blood Cholesterol (Ever Tested)
- Blood Sugar/Diabetes (Ever Tested)
- Mammogram Women >=40 (Last 12 Months)
- Pap smear All Women (Last 12 Months)

Legend:
- Control Mean
- Control Mean plus Medicaid Effect
- CI for Medicaid Effect
Results: Access & Use of Care

Gaining insurance resulted in increased probability of hospital admissions, primarily driven by non-ED admissions.

<table>
<thead>
<tr>
<th></th>
<th>CONTROL</th>
<th>RF Model (ITT)</th>
<th>IV Model (ToT)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any hospital admission</td>
<td>6.7%</td>
<td>+.50%</td>
<td>+2.1%</td>
<td>.004</td>
</tr>
<tr>
<td>--Admits through ED</td>
<td>4.8%</td>
<td>+.2%</td>
<td>+.7%</td>
<td>.265</td>
</tr>
<tr>
<td>--Admits NOT through ED</td>
<td>2.9%</td>
<td>+.4%</td>
<td>+1.6%</td>
<td>.002</td>
</tr>
</tbody>
</table>

SOURCE: Hospital Discharge Data

Overall, this represents a 30% higher probability of admission, although admissions are still rare events.
Hospital Utilization for Selected Conditions

- Heart Disease
- Diabetes
- Skin Infection
- Mental Disorders
- Alcohol or Substance
- Back Problems
- Pneumonia

Control Mean
CI for Insurance Outcome
Implied Outcome for Insured
Summary: Access & Use of Care

Overall, utilization and costs went up. Relative to controls….

- 30% increase in probability of an inpatient admission
- 35% increase in probability of an outpatient visit
- 15% increase in probability of taking prescription medications
- Total $777 increase in average spending (a 25% increase)

With this spending, those who gained insurance were….

- 35% more likely to get all needed care
- 25% more likely to get all needed medications
- Far more likely to follow preventive care guidelines, such as mammograms (60%) and PAP tests (45%)
## Results: Financial Strain

Gaining insurance resulted in a reduced probability of having medical collections in credit reports, and in lower amounts owed.

<table>
<thead>
<tr>
<th></th>
<th>CONTROL</th>
<th>RF Model (ITT)</th>
<th>IV Model (ToT)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Had a bankruptcy</td>
<td>1.4%</td>
<td>+0.2%</td>
<td>+0.9%</td>
<td>.358</td>
</tr>
<tr>
<td>Had a collection</td>
<td>50.0%</td>
<td>-1.2%</td>
<td>-4.8%</td>
<td>.013</td>
</tr>
<tr>
<td>--Medical collections</td>
<td>28.1%</td>
<td>-1.6%</td>
<td>-6.4%</td>
<td>.0001</td>
</tr>
<tr>
<td>--Non-medical collections</td>
<td>39.2%</td>
<td>-0.5</td>
<td>-1.8%</td>
<td>.455</td>
</tr>
<tr>
<td>$ owed medical collections</td>
<td>$1,999</td>
<td>-$99</td>
<td>-$390</td>
<td>.025</td>
</tr>
</tbody>
</table>

**SOURCE:** Credit report data
Self-reported Financial Strain
Mail Survey Data

Control Mean
Control Mean plus Medicaid Effect
CI for Medicaid Effect
Summary: Financial Strain

Overall, reductions in collections on credit reports were evident

- 25% decrease in probability of a medical collection
- Those with a collection owed significantly less

Household financial strain related to medical costs was mitigated

- Substantial reduction across all financial strain measures
- Captures “informal channels” people use to make it work

Implications for both patients and providers

- Only 2% of bills sent to collections are ever paid
### Results: Self-Reported Health

Self-reported measures showed significant improvements one year after randomization

<table>
<thead>
<tr>
<th></th>
<th>CONTROL</th>
<th>RF Model (ITT)</th>
<th>IV Model (ToT)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health good, v good, excellent</td>
<td>54.8%</td>
<td>+3.9%</td>
<td>+13.3%</td>
<td>.0001</td>
</tr>
<tr>
<td>Health stable or improving</td>
<td>71.4%</td>
<td>+3.3%</td>
<td>+11.3%</td>
<td>.0001</td>
</tr>
<tr>
<td>Depression screen NEGATIVE</td>
<td>67.1%</td>
<td>+2.3%</td>
<td>+7.8%</td>
<td>.003</td>
</tr>
<tr>
<td>CDC Healthy Days (physical)</td>
<td>21.86</td>
<td>+.381</td>
<td>+1.31</td>
<td>.018</td>
</tr>
<tr>
<td>CDC Healthy Days (mental)</td>
<td>18.73</td>
<td>+.603</td>
<td>+2.08</td>
<td>.003</td>
</tr>
</tbody>
</table>

**SOURCE:** Mail Survey Data
Summary: Self-Reported Health

Overall, big improvements in self-reported physical & mental health

- 25% increase in probability of good, very good, or excellent health
- 10% decrease in probability of screening for depression

Physical health measures open to several interpretations

- Improvements consistent with findings of increased utilization, better access, and improved quality
- BUT in our “baseline” surveys, results appeared shortly after coverage (~2/3rds magnitude of full results)
- May suggest increase in perception of well being rather than phys health

Biomarker data can shed light on this issue
Focusing on specific conditions

- Measured:
  - blood pressure
  - cholesterol levels
  - glycated hemoglobin
  - depression

- Reasons for selecting these:
  - Reasonably prevalent conditions
  - Clinically effective medications exist
  - Markers of longer term risk of cardiovascular disease
  - Can be measured by trained interviewers and lab tests

- A limited window into health status
Post-lottery Diagnosis (Dx) and Current Medication (Rx)

Inperson Survey Data

- Hypertension
- High cholesterol
- Diabetes
- Depression

Control Mean
Control Mean plus Medicaid Effect
CI for Medicaid Effect
Blood Pressure
Inperson Survey Data

[Bar chart showing blood pressure levels for different groups, including:
- Systolic and Diastolic for Full Sample
- Systolic for Hypertension Diagnosis pre-lottery

Legend:
- Control Mean
- Control Mean plus Medicaid Effect
- CI for Medicaid Effect]
Framingham Risk Score gives the 10 year predicted risk of cardiovascular disease.
Results on specific conditions

- Large reductions in depression
  - Increases in diagnosis and medication
  - In-person estimate of -9 percentage points in being depressed

- Glycated hemoglobin
  - Increases in diagnosis and medication
  - No significant effects on HbA1c; wide confidence intervals

- Blood pressure and cholesterol
  - No significant effects on diagnosis or medication
  - No significant effects on outcomes

- Framingham risk score
  - No significant effect (in general or sub-populations)
Health-Related Quality of Life

Inperson Survey Data

- NoNery Mild Pain
- SF-8 Mental Score
- SF-8 Physical Score

Control Mean
Control Mean plus Medicaid Effect
CI for Medicaid Effect

*A Higher SF-8 score indicates higher self-reported quality of life. The scale is normalized to yield means of 50 and standard deviations of 10 in the general U.S. population; the range is 0 to 100.*
Smoking and Obesity

Inperson Survey Data

Currently Smoking

Obese

Control Mean
Control Mean plus Medicaid Effect
CI for Medicaid Effect
Summary

- One to two years after expanded access to insurance:
  - Increases in health care use (and associated costs)
  - Increases in compliance with recommended preventive care
  - Improvements in quality and access
  - Reductions in financial strain
  - Improvements in self-reported health
  - Improvements in depression
  - No significant change in specific physical measures

- Sense of the relative magnitude of the effects
  - Use and access, financial benefits, general health, depression
  - Physical measures of specific chronic conditions
Extrapolation to ACA Expansion

- Context quite relevant for health care reform:
  - States can chose to cover a similar population in planned 2014 Medicaid expansions (up to 138% of FLP)

- But important caveats to bear in mind:
  - Oregon and Portland vs. US generally
  - Voluntary enrollment vs. mandate
  - Partial vs. general equilibrium effects
  - Short run (1-2 years) vs. medium or long run
Updating based on our findings

“Medicaid is worthless or worse than no insurance”
- We see increases in utilization and perceived access and quality, reductions in financial strain, improvement in self-reported health, improvement in depression, and can reject large declines in several physical measures

“Health insurance expansion saves money”
- In short run we see increases in utilization and cost and no change in emergency department use
- We see increases in preventive care, improvements in self-reported health, and improvements in depression
Conclusion

- Effects of expanding Medicaid likely to be manifold
  - Hard to establish with observational data (often misleading)

- Expanding Medicaid generates both costs and benefits
  - Increases spending
  - Measurably improves some aspects of health but not others
    - Weighing them depends on policy priorities – “ink blot” for policy priors

- Further research on alternative policies needed
  - Many steps in pathway between insurance and outcome
  - Role for innovation in insurance coverage
  - Complements to health care (e.g. social determinants)
Always an Adventure
Acknowledgments

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  - NIA, RWJ, SRF, Sloan, MacArthur, CHCF, SSA, ASPE, CMS
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