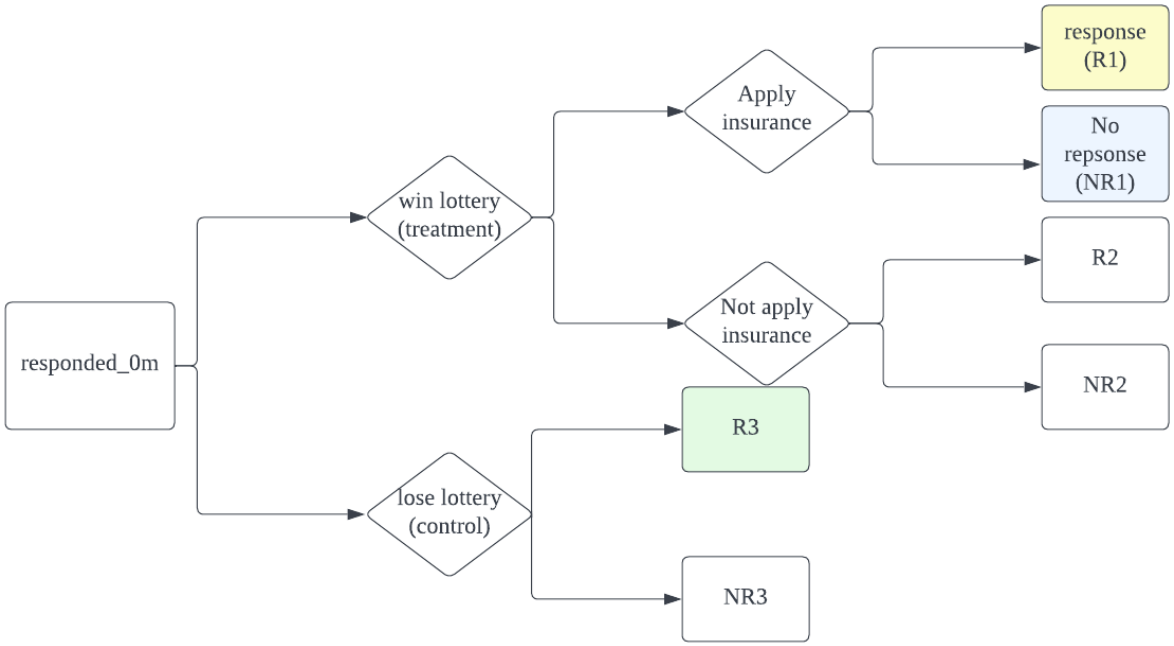
The effect of Medicaid expansion on health

Introduction:

Oregon implemented the Medicaid expansion to help low-income adults who wanted health insurance to get OHP standard coverage. The State offered eligible adults the chance to win OHP standard insurance through a lottery. In early 2008, the State increased lottery available slots to 29000. There were 89,824 candidates placed on the list competing for lotteries, and 30% of selected 35169 individuals, 29664 households, successfully enrolled. As the health of the population is one of the indicators of the average person's living conditions, and the lottery provides an opportunity to study the impact of access to public insurance using a randomized controlled design framework, it is meaningful and feasible to discover the impact of this Medicaid expansion on individual health based on an empirical experiment.

Methodology:

- Of 89,824 candidates, we select 74922 individuals representing 66385 households as our total sample size. Of these, 29834 individuals were selected by the lottery and 45088 individuals are controls. To avoid finite sample problems, we add statistical inferences such as P-value and standard error in result tables.
- To discover the impact of Medicaid expansion on individual health, define the treatment as getting OHP standard insurance by winning the lottery. Here is the process diagram.



- Based on the available data and the whole process of lottery winning and OHP applying, we compare the collected data from R1 with R3 to analyze the effect of Medicaid expansion. However, results concluded according to group R1 might be influenced by probable selection bias for omitting data from NR1. For instance, people with improved health ignored the survey while people with unbenefited health replied to complain, causing the estimation effect of treatment downward. We design two methods to test and minimize this latent selection bias. First, we compare the baseline characteristics of people in groups R1 and NR1 at month 0 to test if individuals in R1 and NR1 come from a similar initial group. However, this method cannot guarantee that initially, similar people will act similarly as time passes by. So, we used the second method to show if people choose to respond randomly, which does not influence by the treatment. Then, we discover the effect of Medicaid by winning the lottery on health outcomes.

- Build pooled OLS model to discover the impact of Medicaid expansion on individual health. In order to minimize confounders or selection problems, we add an Instrumental Variable "Lottery" to replicate randomized experiments, which represents whether a sample individual received a lottery.

$$X_{ih} = \beta_0 + \beta_1 * Lottery_h + \beta_2 * C_{ih} + \epsilon_{ih}$$
$$y_{ih} = \pi_0 + \pi_1 * X_{ih} + \pi_2 * C_{ih} + \epsilon_{ih}$$

  Where i denotes an individual, h denotes a household. $Lottery_h$ is instrumental variable, C_{ih} denotes constant variable, X_{ih} represents interested variable and y_{ih} represents outcomes. We start with comparing effects of certain factor X on different outcomes y, where the different y should reflect individual health state and X can reflect Medicaid expansion. Then, choose an outcome y^* that has significant and interesting correlation with X. Next, according to data type of y^*, use pooled OLS regression model to discover factors Ws other than X that can significantly influence y^*, and see whether X has different effect on y^* while adding in Ws.

  Data:

  Define 12m to be taking Mail Survey in 12 months after winning lottery.

- We have data on whether an individual received an OHP application and use it as Instrumental Variable "Lottery" because individuals winning the lottery is equivalent to individuals receiving the OHP application. Data about whether someone currently has OHP insurance is our interested variable X. Then we can consider the effect of Medicaid by looking at people with OHP insurance by winning the lottery, which is based on data from group R1. To reflect individual health state, we have two groups of outcomes y.

One group of outcomes, panel A, reflects the individual's health, including physical health and mental health. The other group of outcomes, panel B, reflects an individual's ability to improve health, including whether a doctor takes OHP standard insurance, medical expense deficit, and medical quality. To reduce the omitted variable bias on the coefficient estimation of interesting variables, we add in control variables C including Scrambled household identifier, whether have other insurance coverage currently, sex, age, the highest level of education completed, household income as a percent of the federal poverty line and whether currently smoke. In addition, we define baseline characteristics as overall health, sex, education, age, and race at month 0.

Results and Interpretation:

- Compare the baseline characteristics of people in group R1 and NR1 at month 0.

Baseline characteristics at month0	Mean value in R1 group	Difference between R1 and R2	95% CI for difference
Overall health	.3856439	-.0040784	[-.0311193, .0229625]
Female	.5791341	-.0230512	[-.050799, .0046966]
Education	.6586911	.0108368	[-.0153675, .0370411]
White	.8135116	.0036388	[-.0178942, .0251719]
Other races	.0916138	-.0047373	[-.0204703, .0109958]

- Since the confidence interval includes 0 for baseline characteristics, it is 95% confident to say that people from groups R1 and NR1 are from a similar initial group at month 0. Hence, the results concluded from R1 can be representative of both R1 and NR1 groups.

- Examine if people choose to respond randomly relative to getting OHP insurance by winning the lottery. Use the indicator of having Medicaid at month 0 to predict R1, which is whether people responded in month 12.

Table I

Effect of having OHP on R1

VARIABLES	(1) R1
Accepted to OHP standard	0.0133*
	(0.008)
Health_0m	-0.0259**
	(0.012)
Number of people in household on lottery list	0.0156
	(0.013)
age_0m	0.0047***
	(0.001)
Female: 0m survey	0.0437***
	(0.012)
High education_0m	-0.0779***
	(0.013)
Constant	0.4280***
	(0.033)
Observations	6,643
R-squared	0.024

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

According to Table I, the estimated coefficients on whether people have Medicaid is 95% statistically insignificant, meaning having Medicaid does not influence people's decision to reply survey in a month12. Hence, results achieved from R1 representative for both people in groups R1 and R2, so that the general effect of Medicaid expansion on individual health can be obtained just based on the data from R1.

- Comparing effects of winning lottery on different outcomes y

Table II

Compare outcomes

VARIABLES	(1) physical health	(2) mental health	(3) doc decline insruance	(4) medical quality	(5) medical deficit
Currently have OHP insurance	-0.6621	-1.5963	0.1029**	0.2164***	-0.2311***
	(1.048)	(1.113)	(0.041)	(0.045)	(0.048)
Number of people in household on lottery list	-0.8134***	-1.8474***	0.0032	0.0067	-0.0606***
	(0.202)	(0.211)	(0.005)	(0.010)	(0.009)
Currently have other insurance coverage	1.5559***	0.3355	0.0454***	0.0973***	-0.0303
	(0.426)	(0.446)	(0.013)	(0.019)	(0.019)
Female	0.1194	1.0560***	-0.0031	0.0181*	0.0798***
	(0.192)	(0.201)	(0.005)	(0.009)	(0.009)
High education	0.8284***	0.5140**	-0.0098**	-0.0227**	0.0221**
	(0.195)	(0.204)	(0.005)	(0.009)	(0.009)
age	0.1744***	0.0749***	-0.0005**	0.0027***	-0.0002
	(0.008)	(0.008)	(0.000)	(0.000)	(0.000)
Household income as percent of federal poverty line	-0.0207***	-0.0200***	0.0000	0.0008***	-0.0003***
	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)
Do you currently smoke cigarettes?	-1.0385***	-1.5324***	0.0018	0.0397***	-0.0616***
	(0.103)	(0.108)	(0.003)	(0.005)	(0.005)
Constant	6.4679***	14.5364***	0.0362**	0.3999***	0.7905***
	(0.663)	(0.696)	(0.017)	(0.034)	(0.030)
Observations	12,852	12,938	4,894	9,672	13,858
R-squared	0.072	0.051	0.056	0.039	0.021

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

From Table II, we used 2sls IV regression. It is interesting to find out that Medicaid expansion mainly improved individuals' quality of medical care and reduced financial pressure on medical expenses without significant affect individual health. Surprisingly, Medicaid also had a unignorably negative effect. In detail, one current OHP standard insurance increased 10.29% the likelihood that a doctor might refuse to accept it, which was more likely than people with other insurance coverage which was only 4.54%.

Moreover, other insurance coverage significantly improved physical health with a 1.4029 likelihood while OHP standard insurance even had an insignificantly negative impact on physical and mental health. However, these two downsides could be downside biased by omitted variables. Next, we are interested in digging into the effect of OHP insurance on the outcome that a doctor rejects this insurance. So, the next step is to find out possible missing variables that would cause estimation bias.

- Consider previously omitted factors which influenced doctors to reject OHP insurance. Since having OHP insurance is randomly controlled by lottery, we start with adding in factors that might relate to doctor rejection instead of having OHP coverage, and then see how the estimated effect of having OHP insurance changes. We first select factors by guessing from two aspects of OHP insured and doctor sides respectively and confirm factors based on statistical analysis after regression. In the aspect of insured, since OHP standard insured are randomly selected from low-income adults, check if the insureds' financial credit record or health history caused doctor rejection to take the insurance. In the aspect of a doctor, check if OHP insurance was rejected more often by private or public doctors, or if the doctor prefers other kinds of insurance coverage. Besides, since smoking does not show a significant impact on doctor rejection, we will drop it in the later analysis.

Table III
Find Factors causing doc rejection

	(1) 0 Factor	(2) 1 Factor	(3) 2 Factors	(4) 3 Factors	(5) 4 Factors	(6) 5 Factors	(7) 6 Factors	(8) 7 Factors
Currently have OHP insurance	0.0894*	0.0970*	0.0963*	0.0760	0.0677	0.0692	0.0666	0.0685
	(2.24)	(2.45)	(2.44)	(1.93)	(1.71)	(1.62)	(1.54)	(1.58)
Household members	0.0026	0.0035	0.0040	0.0036	0.0031	0.0022	0.0016	0.0017
	(0.48)	(0.66)	(0.76)	(0.65)	(0.56)	(0.39)	(0.28)	(0.31)
Female	-0.0028	-0.0025	-0.0024	-0.0018	-0.0021	-0.0027	-0.0027	-0.0022
	(-0.55)	(-0.50)	(-0.48)	(-0.34)	(-0.41)	(-0.52)	(-0.53)	(-0.43)
High education	-0.0104*	-0.0108*	-0.0105*	-0.0130**	-0.0121*	-0.0122*	-0.0119*	-0.0114*
	(-2.12)	(-2.21)	(-2.12)	(-2.59)	(-2.40)	(-2.42)	(-2.36)	(-2.27)
age	-0.0005*	-0.0004*	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0005*
	(-2.28)	(-2.08)	(-1.82)	(-1.88)	(-1.76)	(-1.75)	(-1.82)	(-2.01)
Household income	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(-0.24)	(-0.08)	(-0.08)	(-0.03)	(-0.25)	(-0.24)	(-0.39)	(-0.39)
Current medical deficit		0.0041	0.0041	-0.0018	-0.0011	-0.0005	-0.0000	-0.0003
		(0.82)	(0.77)	(-0.32)	(-0.20)	(-0.08)	(-0.01)	(-0.05)
Skipped medical bills			0.0033	-0.0009	-0.0022	-0.0032	-0.0038	-0.0032
			(0.62)	(-0.17)	(-0.40)	(-0.54)	(-0.63)	(-0.53)
Have been refused for owing money				0.0358***	0.0331***	0.0337***	0.0340***	0.0341***
				(4.76)	(4.37)	(4.46)	(4.50)	(4.53)
Overall health					-0.0075	-0.0085	-0.0080	-0.0079
					(-1.45)	(-1.64)	(-1.54)	(-1.53)
personal doctor						0.0083	0.0027	0.0007
						(0.99)	(0.34)	(0.09)
Usually see private doctors or clinic							0.0156*	0.0154*
							(2.08)	(2.06)
Have other insurance coverage								0.0469***
								(3.47)
Constant	0.0439**	0.0365*	0.0316	0.0369*	0.0430**	0.0417*	0.0427*	0.0424*
	(2.85)	(2.27)	(1.95)	(2.24)	(2.60)	(2.45)	(2.49)	(2.47)
Observations	4874	4825	4784	4466	4394	4366	4366	4366
R^2	0.052	0.055	0.053	0.050	0.049	0.049	0.050	0.053
Adjusted R^2	0.051	0.053	0.051	0.048	0.047	0.047	0.047	0.050

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table III shows that, with the increase of factors in the model, the positive effect of OHP insurance on doctor refusal gradually decreases until it is not significant. To be specific, on the insured side, the influence of an individual's historical record of medical deficit and skipping health care bills on the doctor's rejection of OHP insurance indicates that the poor record of an individual's medical expenditure did not affect the doctor's decision. Moreover, higher education and older age reduced the likelihood that doctors would refuse to accept the insurance. However, if an individual had been rejected by a doctor because of unpaid bills before, his OHP coverage would be more likely rejected in the future. For individual health, it insignificantly affected doctors' decisions. In the aspect of a doctor, private doctors or clinics were more likely to reject OHP insurance while personal doctors did not influence much. Importantly, the additional factor, whether OHP insured had other insurance coverage, not only significantly increased the likelihood of doctors' rejection of OHP but also improved the model as both adjusted R square and R square increased. Hence, doctors prefer other insurance than OHP insurance, and this factor was a more accurate predictor of doctors' rejection behavior than other factors we considered.

Conclusion:

- Individuals responded to the survey randomly relative to getting OHP insurance by winning the lottery, so data gathered from people with OHP standard coverage who responded can represent those who did not respond. Hence, the effect of Medicaid expansion on individual health would not be influenced by response selection bias.
- Medicaid expansion has mainly eased the financial burden on insureds' medical expenses and improved the medical quality insureds got. Hence, Medicaid expansion increased an individual's ability to become healthy. However, it does not significantly improve

individuals' health states and increased the likelihood of doctors' rejection of OHP standard insurance.

- Factors that lead doctors to reject OHP coverage include education degree, age, whether have been refused care for owing money or have other insurance. The OHP standard insureds with higher education and older age are less likely to be rejected. In addition, Insureds who have been denied care for owing medical bills, or who already have other insurance, are more likely to have their OHP coverage rejected. Importantly, once include all these factors, the effect of having OHP insurance becomes insignificant to doctors' rejection behavior. This indicates that doctors refuse OHP insurance not simply because the insurance is OHP standard, but because of various considerations.

Reference:

Amy Finkelstein, Sarah Taubman, Bill Wright, Mira Bernstein, Jonathan Gruber, Joseph P. Newhouse, Heidi Allen, Katherine Baicker, Oregon Health Study Group, The Oregon Health Insurance Experiment: Evidence from the First Year*, The Quarterly Journal of Economics, Volume 127, Issue 3, August 2012, Pages 1057–1106, https://doi.org/10.1093/qje/qjs020