

# Preliminary Analysis

Sam Cohen

2023-04-15

## Motivation

Insurance is a shared good. As we use it, we enter into a contract with all others in this same pool as us. Similar to voting, one person's actions may not seem to have much of an effect, but if we all act in a certain way, the consequences can be felt. In this case I will be talking about ex ante moral hazard (for the rest of this analysis I will exclusively be referring to the ex ante variant of moral hazard rather than ex post). Moral hazard is the phenomenon where individuals who are covered by insurance are more willing to act riskier in regards to their health, presumably, this is because they know if they become sick or injured, they would not have to pay a great deal. For example, if someone just got a really great new policy from a new job, this person may be more willing to go spelunking or base jumping like they have always wanted to try. While this is an extreme example, there are other smaller scale possibilities of riskier behavior that when aggregated over a risk pool can add up to significantly higher costs. In current policy, moral hazard is dealt with by cost-sharing such as co-pays or co-insurance. This is so the policy holders do not act as though their health is of no cost to themselves.

When moral hazard occurs on a large scale within a population, insurance premiums must increase to accommodate the increased risk that the insurance companies now face. Moral hazard then not only adversely affects the health and welfare of those covered by insurance, but it also raises the costs of insurance for both those engaged in riskier behaviors and those who do not. If we are able to limit the magnitude of moral hazard, then we should not only have cheaper insurance, but a healthier population as well.

## Data

In order to analyze moral hazard, I will be looking at the Behavioral Risk Factor Surveillance System (BRFSS) data from the CDC from years 2017-2019. This has been collected by the CDC by surveys conducted by phone. Research on moral hazard needs data on risky behaviors as well as a treatment status, the BRFSS surveys have data on all I will need. Through their online portal, I am able to select all of the variables from those available. To look at moral hazard, I will look at risky behaviors such as rates of unprotected sex, smoking, and alcohol consumption. I will also look at healthy behaviors that may be done more often when not covered by insurance such as consumption of vegetables or exercise. I will also need my treatment variable of health insurance status as well as other covariates such as age. This data will then

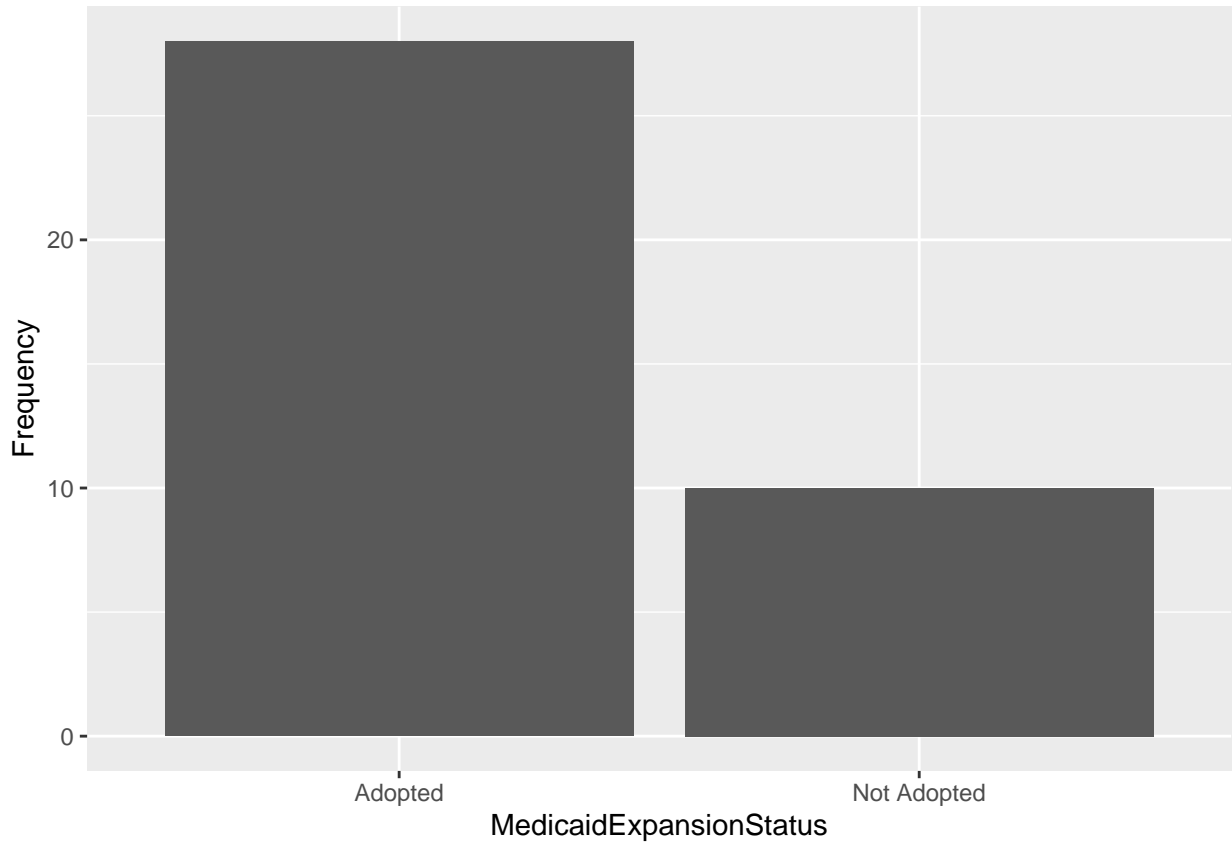
be summarized at the state level with the risky behaviors becoming a share of the individuals who partake in them at the state level.

I was initially intending on utilizing an RD approach by looking at the difference between 25 and 26 year olds (as 26 year olds are no longer able to be covered by their parents plans). Unfortunately, the BRFSS data does not have individual age points, but rather age groupings, thus eliminating the possibility of an RD approach. Instead, I will be using Medicaid expansion as an instrumental variable. Medicaid expansion functions as an instrumental variable by affecting treatment, insurance coverage, without directly affecting risky behavior rates. In order to get my final dataset then, I will merge a dataset of each state and whether it expanded in 2014. I will not be including states that expanded in later years.

## Analysis: Tables and Figures

Health Coverage	Smoker	BingeDrink	Exercise	FluVax	HIVRisk
Min. :1.000	Min. :1.00	Min. : 1.0	Min. :1.00	Min. :1.00	Min. :1.00
1st Qu.:1.000	1st Qu.:1.00	1st Qu.:30.0	1st Qu.:1.00	1st Qu.:1.00	1st Qu.:2.00
Median :1.000	Median :2.00	Median :88.0	Median :1.00	Median :2.00	Median :2.00
Mean :1.112	Mean :1.61	Mean :66.3	Mean :1.28	Mean :1.59	Mean :1.99
3rd Qu.:1.000	3rd Qu.:2.00	3rd Qu.:88.0	3rd Qu.:2.00	3rd Qu.:2.00	3rd Qu.:2.00
Max. :9.000	Max. :9.00	Max. :99.0	Max. :9.00	Max. :9.00	Max. :9.00
NA's :56	NA's :59613	NA's :897382	NA's :54042	NA's :113154	NA's :146796

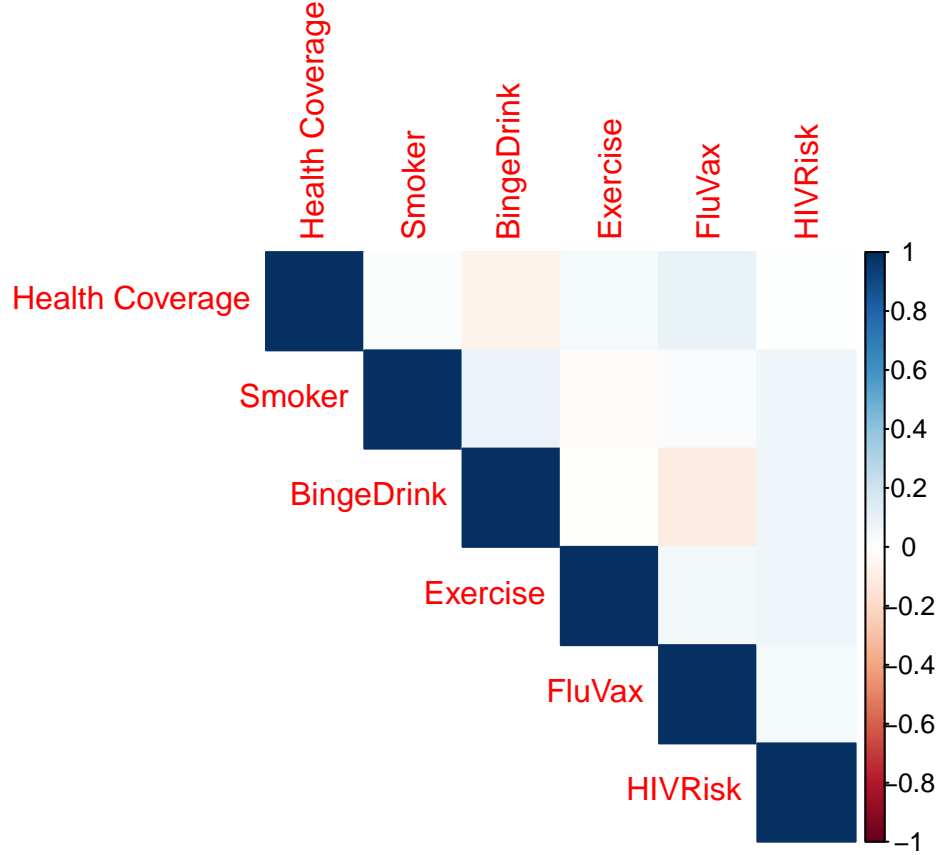
To start, my first table is some brief summary statistics on my dataset. Every variable, except binge drinking, has a 1 for Yes, and a 2 for No. Binge drinking's value is the number of times one has binge drunk in the past 30 days, an 88 means they did not binge drink at all and a 99 means they refused to answer.



In this first plot, it shows the frequency of states that adopted or refused to adopt Medicaid expansion. This data though does not include states that adopted after 2014 in either group and were instead excluded from the dataset.

	Health Coverage: Yes		No
Vaccine: Yes	45.74781	54.25219	
Vaccine: No	18.49822	81.50178	

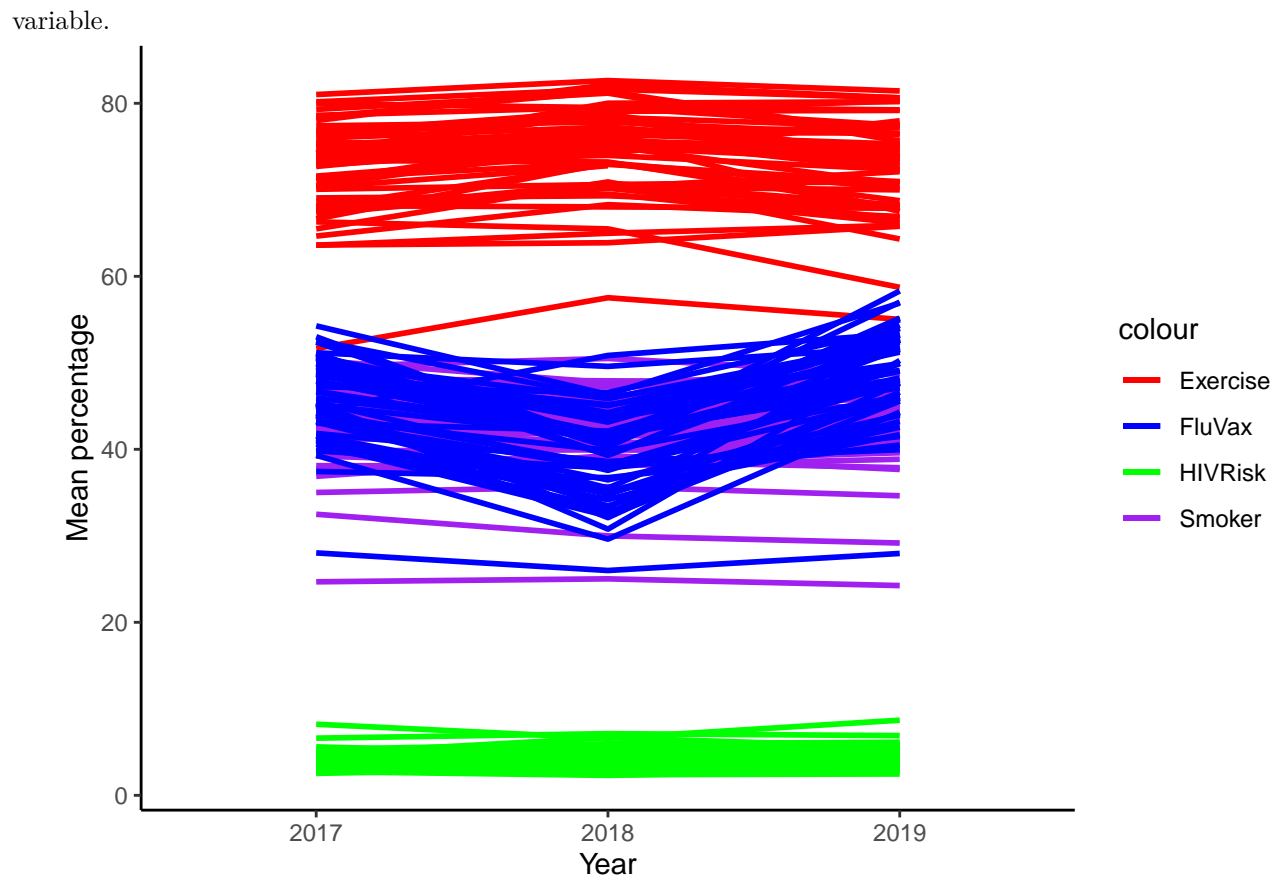
This I found to be interesting by itself as vaccinations represents a bit of ex ante and ex post moral hazard. Vaccines function as a preventative healthcare measure, thus it is a risk to not get a vaccine, but also are healthcare themselves so they are more prone to being utilized when someone has healthcare coverage. The above table confirms that it seems ex post moral hazard is stronger in terms of vaccines than ex ante.



From this figure, we can see that the risky behaviors are not very correlated with one another, meaning I should be able to analyze each one independently and see how coverage affects each individual behavior. My ultimate goal with a project like this is to determine the behavioral elasticity of risky behaviors with healthcare coverage, and this shows that since they are not correlated that it is possible different types of people do different risky behaviors.

Expansion	Smoker	Exercise	Flu Vax	HIV Risk
Adopted	42.92482	74.30890	45.88317	4.35643
Not Adopted	43.10336	70.25187	42.82532	4.06403

This table shows the different percentages of the share of aggregated individuals by state and year of different behaviors. This is then separated by states that expanded Medicaid and those that did not. As you can see these means of percentages are not very different. Although I am not accounting for the fact that the demographics are different for the types of states that expanded or not, the means are still similar. I wanted to show this table as a precursor for my further analysis. These are some of my output variables stratified by my instrumental variable. To be honest, it makes me think I will likely not see a difference when I run my actual regression, but it is important to see still at this point that medicaid expansion itself does not seem to have a large impact on health behaviors, meaning it is likely to be a good instrumental



This chart, while being not terribly pleasant to look at, represents four different health behavior trends over the years. Each line is a different state showing that state's percentage of individuals who exhibit one of these behaviors. It is fairly difficult to discern any meaningful data from this plot, but it does show that on average, these behaviors did not change in the share for this time range.

	Smoker	Exercise	Flu Vaccination	HIV Risk
(Intercept)	42.587 (1.416)	81.988 (2.412)	51.671 (2.697)	4.910 (0.586)
fit_Uninsured	0.047 (0.170)	-1.073 (0.290)	-0.809 (0.324)	-0.077 (0.070)
Num.Obs.	113	113	113	113
R2	-0.023	-0.082	0.130	-0.167
R2 Adj.	-0.033	-0.092	0.122	-0.178
AIC	572.3	692.6	717.9	373.0
BIC	577.8	698.1	723.3	378.5
RMSE	2.99	5.09	5.70	1.24
Std.Errors	IID	IID	IID	IID

I then ran four separate regressions looking at the same behaviors as before. This data had 113 observations at the state level from 2017-2019. These were instrumental variable estimations using medicaid expansion as a instrument for uninsurance rates. I then looked at the rates of these behaviors regressed

on uninsurance rates. These results are not all what I expected, and all except vaccination status, are not statistically significant. Smoking actually saw a small rise in the usage with uninsurance, which would indicate that moral hazard does not affect smoking. This already may be the case though as smoking is factored into costs of insurance whereas some of these other behaviors are not. Exercise also decreases with insurance rates which may make sense as lower income individuals may not have the time to exercise that other groups, more likely to have insurance would. Vaccination rates has a negative coefficient here and is statistically significant. From this we can potentially see that the ex post moral hazard is greater than ex ante for vaccination. What this means is that more people get vaccinated due to having insurance compared to those who get the vaccine out of worry of not having insurance. Lastly, HIV risk behaviors do see a correlation we would expect with moral hazard, although these results also are not statistically significant. Also, indicated from the negative  $r$  squared values for 3/4 of my results, it is clear that either this was not the correct approach or there is no strong effects of uninsurance on these behaviors, and thus little evidence to indicate that ex ante moral hazard is a factor whatsoever.