Senior Project

Department of Economics

Medicaid: The Expansion Effects on Mental Health

Xavier Swiger

Spring 2022

Advisor: *Dr. Ali Enami*

Abstract

Medicaid is a federal and state program aimed to help people with limited income and resources to pay for various healthcare related services, such as mental health or doctor visits. The expansion of Medicaid plays a significant role in public healthcare. Most people in need of mental health care are of low income, which is the group Medicaid expansion primarily impacts. Analysis using county-level data between the years 2011 – 2016 are used in this paper. Data is obtained from Country Health Rankings (2022). A difference-in-differences model is used with a two-way fixed effects model covering the 48 contiguous states. The two primary dependent variables are the mental health provider ratio at the county level and the county average poor mental health days (self-reported). The results from the two multivariate regressions show that neither county average poor mental health days nor the mental health provider ratio are not statistically significant to the expansion of Medicaid. Residuals appear to be random, and the control variables are significant in the model, making it a good fit. However, there is a significant increase in mental health providers in both treatment and control groups. More research needs to be done to see why there was such an increase in providers around 2012 and 2013 to understand effective policy in increasing the mental well-being of people throughout the United States.

Table of Contents

I.   **Introduction**

Understanding determinants of mental illness is essential in creating effective policy to increase not only the quality of life for people, but also their productivity. According to Burton (2008), depressive disorders are the most common mental health issue in the workplace, and they have a significant negative impact on performance. Results from policies may differ depending on the state or country it takes effect. Does the expansion of Medicaid have positive effects on the mental health of the states it was implemented in?

Medicaid is among the largest sources of funding for medical related services for low-income individuals. It was first enacted in the 1960s and has been around ever since. This paper focuses on the 2014 expansion of the program, in which more people are covered. Prior studies of the effect of Medicaid expansion on mental health have compared states that expanded their programs to others and some studies focused on states such as Maine and Minnesota. However, to the best of my knowledge, there is no prior research on the effect Medicaid expansion has had on mental health throughout the entire U.S. Therefore, this paper contributes to the literature by using the county level data to analyze self-reports and the mental health provider ratio to determine if the expansion of Medicaid post 2014 has had a statistically significant impact on the mental well-being of people in the U.S.

This study extends Hendryx's (2008) paper on the effectiveness of state mental health expenditure by focusing on post-2008 data to determine whether the relationship between state expenditure and mental health outcomes has changed following the Great Recession. Hendryx (2008) points out that effective communication of successful care models is a main obstacle preventing state expenditures from having a larger impact. However, because of the recent mainstream attention that mental health has received, the issue of sub-optimal communication

may have been diminished and mental health funding may have become more effective in combating this issue. Other policies may also include insurance changes, as it would give greater access to care for those of lower income through systems such as Medicaid. Maclean (2018) touched on this issue and noted the major impact Medicaid has had on mental health and would be a primary policy to investigate. Looking at self-reported data and the supply of mental health providers is a likely indicator of the effectiveness of Medicaid on mental health. The primary question this paper is attempting to answer is: did the expansion of Medicaid have a positive effect on mental health?

II.   **Literature Review**

Mental illnesses have a significant impact on a person's quality of life, as well as their productivity (Burton, 2008). In the United States, it is estimated that nearly fifty-five million adults suffer from a mental illness (National Institute of Mental Health, 2022). Efforts from both public and private entities are being made to reduce its prevalence. However, policy effectiveness is blurred and debated. Measuring a region's mental health is a difficult feat and economists and health experts alike attempt to determine the mental health of counties and states in different ways. Some techniques in measuring mental health include using indicators such as, homelessness, substance abuse, income, and suicide, (for example see Hendryx 2008). Other studies use the utilization of mental healthcare services to determine a policy's effectiveness (for example, see Maclean 2018). The choice of outcome variable is at the heart of the conflict in the literature regarding the effectiveness of mental health expenditures. For example, using homelessness, income, and other related variables as the indicator of interest, Hendryx (2008) finds that there is not a significant relationship between state mental health expenditures and mental health outcomes. However, numerous prior studies find these expenditures to be effective

with regard to indicators such as utilization of mental health services (Maclean 2018). Some policies that have had a suspected impact on mental health include Medicaid, state funding for mental health related services, and the Affordable Care Act. However, the effectiveness of the policies is still debated by both health experts and economists, some say they have no impact, others say it positively affects the entire population, and some take the middle ground.

Those who claimed that the above policies were ineffective or weak at best, noted similar issues within the system that had hindered its performance. This includes a "need for policies that emphasize shared state-local models to implement treatment programs of known effectiveness" (Hendryx, 2008). Maclean (2018) had noted "expansion increased psychotropic prescriptions by 21.0%," however, she had claimed that there was "no statistically significant evidence that Medicaid expansion reduced mental illness" (Maclean 2018). Maclean (2018) finds that their indicator variables had not been changed because of the expansion policies, similar to Hendryx (2008); but they offer conflicting conclusions. This is because Maclean (2018) investigated the utilizations of the services as well.

Another reason why some claim the expansion to be ineffective is the geographic disparities. When looking into Maine, Medicaid beneficiaries in rural areas "have a significantly lower utilization of mental health services than urban beneficiaries" (Lambert and Agger, 1995). However, after controlling for constraints on supply of service, the utilization begins to match that of Urban users, indicating that the barrier to access and having an effective policy is constrained supply rather than eligibility. Those who find that Medicaid expansion is efficient show how further expansion aids in solving the issues with supply constraints.

Many find that the expansion of Medicaid under the Affordable Care Act (ACA) had caused a decrease in the number of people with a mental illness. It is commonly noted that

"people with behavioral health conditions are disproportionately poor and uninsured" (Levit et al., 2013). McMorrow et al. (2016), finds that "improvements would be considerably larger among the states that have currently chosen not to expand Medicaid under the ACA" for the low-income parents than if those states were to expand their Medicaid funding and eligibility (McMorrow, et al. 2016). Furthermore, "the high burden of mental illness and unstable housing [is] the Medicaid expansion population" (Vickery, et al. 2016). Vickery et al. (2016) argue that further expansion will continue to allow for these individuals to have more access to the mental health services even if indicators such as homelessness remain unchanged. Despite the improvements in service usage, there is a consistent call for further research to understand how states could increase the effectiveness of these services with regard to clinical outcomes such as a focus on access (Robinson, et al. 2019).

Medicaid is the largest payer of mental health services in the United States, accounting for more than both private and public entities (Shirk, 2008). Furthermore, the expansion of Medicaid doesn't appear to crowd out other forms of insurance (Cite). Additionally, states that have seen an expansion of Medicaid see "increased probability that a specialty mental health care provider accepts Medicaid coverage" (Blunt, et al. 2020). Meaning that the supply constraints previously mentioned would likely be addressed by further expansion. Richard et al. (2003) finds that Medicaid is a major revenue source for organizations, making up "18 percent of state mental hospital revenues, 27 percent of general hospital psychiatric services revenues, and 24 percent of revenues for community-based providers such as community mental health centers (CMHCs)." Although it was shown there is a higher utilization of mental health services when the supply constraints were fixed, this paper investigates if those supply constraints can be solved through the expansion of Medicaid. Moreover, this paper investigates self-reported mental health to see if

there is a causal link between Medicaid and the self-reports. There has been little research done outside of small panel studies or looking into a few cases in a select few counties post 2014.

III. Data Analysis

The data used covers all counties in the 48 contiguous States. The years that are used in this research range from 2011 – 2016. Sources used to collect the data comes from County Health Rankings (2022) County Health rankings collected data from various government sources including the CDC and the Census Bureau. One constraint that this data holds is the percent of people in a rural area, which only uses data from 2010 for all counties. This is unlikely to have a significant impact on results, however.

The dependent variable(s) for the multivariate regression model include County-level average number of *poor mental health days (PMHD)*, *mental health provider ratio*. Given that PMHD is self-reported and correlate with variables such as "higher unemployment, poverty, percentage of adults who did not complete high school…(County Health Rankings 2022)," a number of control variables included in the model to help with the causal identification of the effect of Medicaid expansion on mental health of the individuals. There is always a concern that self-reported mental health variables are subject to how people perceive the concept of "poor mental health day" and how willing they are to report poor mental health days. We know that the stigma around the topic of poor mental health is decreasing over time, so it is becoming more probable for people to count a day as a bad day and to report it. The difference-in-differences structure of the model used in this analysis should address this issue to some extent. In other words, people in control states, where the Medicaid eligibility remained unchanged, would also report more days of poor mental health over time. The variable mental health provider ratio is

used to see if the supply constraint that other works have noted are solved through the expansion of Medicaid.

The control group for this model is the States that have not expanded their Medicaid program, whereas the treatment group are those who have expanded. While the difference-in-differences model used in this analysis accounts for some of the issues with using a self-reported mental health variable, there may be still some concerns with it. The *mental health provider ratio* (the ratio here is county population for everyone mental health provider) was included to address concerns highlighted in previous research such as (need to find the sources) who argues that treatment variation in various demographics lays more heavily with the supply of mental health providers rather than being insured by Medicaid.

The primary independent variable that will be analyzed is Medicaid expansion. This will be a binary variable where "1" is used if the county is in a state that has expanded its Medicaid program and "0" otherwise. Control variables include population of a county, age *(%less than 18 years old, %over 65 years old),* race *(%African American, %Asian, %Native or Pacific Islander, %Hispanic), gender, %rural, average household income, high school graduation rate, % with some college, % unemployed, poverty rate, and % of single parent households*. Summary statistics and observations can be observed in table 1 and 2. The control variable %rural is used in tangent to David Lamberts (1995) research on the supply of mental health in urban vs rural environments. This is to control for potential mental service supply disparities in predominantly rural or urban regions. As it was mentioned before, demographic controls including age, race, gender, etc. are used because of the variation of responses in poor mental health days noted in the County Health Rankings (2022) as well as controlling for various other factors, including, but not limited to: household income, %poverty, and homicide rate.

IV.   **Methodology and Theory**

There is assumed to be a link between poor mental health days as well as the amount of mental health providers with the expansion of Medicaid for a few reasons. First, low-income individuals will be covered, not only allowing them to receive the mental health treatment they need, but they would also be covered in other areas, lessening their burden, and possibly reducing stress because of having medical coverage they previously may not have had. Furthermore, an increase in the amount of people covered under Medicaid would incentivize private mental health practices to certify their clinicians under Medicaid, which would further raise the supply for people in need of help. Another reason why the expansion would increase the amount of mental health providers is that it would increase the demand for providers, pushing more people into opening mental health practices. The expansion of Medicaid is likely to cause a decrease in the average poor mental health days and an increase in the amount of mental health providers.

Medicaid expansion is analyzed on the county level using the difference-in-differences (DID) method with a two-way fixed effects model. The fixed effects model is used to control for variables that are constant over time for each county, or constant across counties within a given year. The regression model will not include all the States, most of the states that have adopted the program implemented it in 2014. Only 38 of the 50 states will be used, meaning the states that have expanded after 2014 will be excluded from this analysis.

Poor Mental Health Days $_{ct}$ = B_0 + δ**Medicaid Expansion** $_{ct}$ + **X** $_{ct}$ + **Year** $_t$ + **County** $_c$ + ε_{ct} **(1)**

County level poor mental health days is the primary dependent variable in this analysis. This variable is measured for county c in year t. The main variable of interest in the model is

9

Medicaid expansion, which is a binary variable where "1" indicates that county c in year t belongs to a state that has expanded its Medicaid program and "0" if otherwise. *X* represents the control variables used in the regression, these control variables are as follows: *%less than 18 years old, %over 65 years old, %African American, %Asian, %Native or Pacific Islander, %Hispanic, %rural, average household income, high school graduation rate, % with some college, % unemployed, poverty rate, and % of single parent households, %female.* All control variables are represented as a percent of the county population, the only exception is *average household income. Year* and *County* represent year and county fixed effects, respectively. Finally, ε is the white noise.

A second regression equation is used in this analysis, as show below, in which Mental Health Providers Ratio is uses as the dependent variable. The mental health provider ratio for each county is equal to the number of residents in each county per each mental health provider. The reason to use this second model is that if the expansion was successful, there should be more providers as a direct result of expansion. This would be in line with Richard et al. (2003) findings. Using self-reported mental health days may cause inaccuracies in results, however, if supply constraints are solved as a result, there will be a higher utilization of the services, leading to a likely improvement in a county's mental health.

$$\textbf{Mental Health Providers Ratio}_{ct} = = B_0 + \delta\textbf{Medicaid Expansion }_{ct} + \textbf{X }_{ct} + \textbf{Year}_t + \textbf{County}_c + \varepsilon_{ct}$$

For the model to identify a causal effect, the parallel trend assumption needs to hold. Meaning that with the absence of Medicaid expansion, the trend counties would follow, in terms of the average number of poor mental health days and mental health providers ratio, are nearly

the same. Looking at the treatment and control group's trend prior to the expansion of Medicaid would help indicate whether the parallel trend assumption holds. If both groups have a similar pre-treatment trend, but the trend for the treatment group changes at the time policy is implemented, then we can conclude the Medicaid expansion is the cause of this change in trend.

V.   Results

The multivariate model regressing county level poor mental health days against the expansion of Medicaid post 2014 does not appear to be statistically significant. Prior to finding the results, all states that have expanded after the year 2014 were set as non-treatment groups to focus on the 2014 expansion in a narrower lens. However, results were nearly identical and is still deemed statistically insignificant. The new model with post 2014 expansion was used as the primary dataset throughout this analysis. The treatment holds a p-value of about 0.9 with the residuals appearing to be random, making the model a good fit. Furthermore, the trends observed in graph 1 show no change in the slope post treatment. Average poor mental health days is likely an unreliable measure of mental health, as the definition of mentally unhealthy changes as time goes on, meaning that changes are likely to appear more random than not. The other multivariate model regressing the mental health provider ratio also appears to be not statistically significant with the expansion of Medicaid, with that model being a good fit as well (see table 3 for regression results). Any changes post treatment for either model is likely to be random or not a result of the expansion of Medicaid.

VI.   Conclusion

With the expansion of Medicaid being statistically insignificant to both the mentally unhealthy days and the mental health provider ratio, there is still an interesting trend observed in

graphs 1 and 2, where there is a major increase in the number of providers in both non-treatment and treatment states around 2012 and 2013. There are a few possible explanations for this increase. First, the increased focus on mental health and as a result, increased providers. However, some mental health practices have expressed their concern with Medicaid patients, as they lose the most money on them because they cannot charge any fees not related to treatment. More research needs done on the responses private practices have because of increased people covered by Medicaid.

Graphics [1]

Graph 1
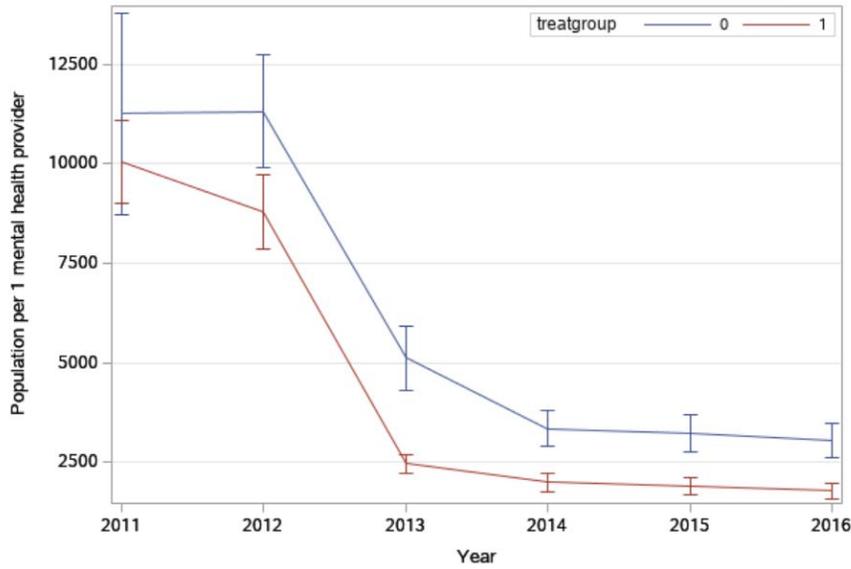
Graph 2
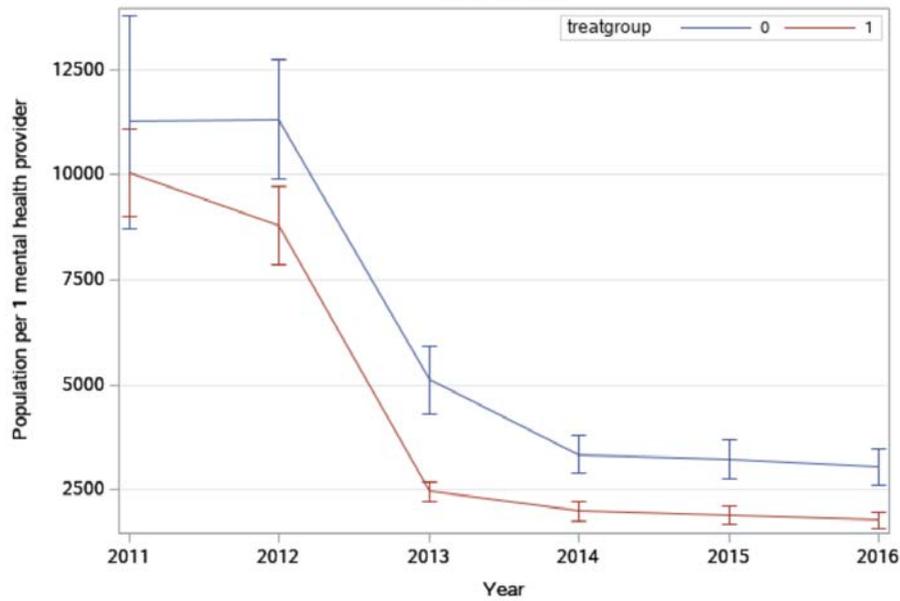
Tables

Table 1						
Variable						
African American	Percent of the county that is African American					
Asian	Percent of the county that is Asian					
Native American	Percent of the county that is Native American					
Rural	Percent of the county that lives in a rural area					
Graduated High School	Percent of the county that graduated high school					
College	Percent of the county with some college experience					
Children in poverty	Percent of the children in the county that is in poverty					
Female	Percent of the county that is female					
Hispanic	Percent of the county that is Hispanic					
Treatment	Expansion of Medicaid					
Under 18	Percent of the county that is under 18 years old					
Over 65	Percent of the county that is over 65 years old					
Single Parent Household	Percent of the county that has a single parent household					
Mental health provider ratio	Population for everyone mental health care provider					
Poor mental health days	Average county self-reported poor mental health days					

Table 2					
	Observations	Min	Max	Mean	STD
County average poor mental health days	8823	0.40	9.20	3.70	0.816
Mental health provider ratio	7907	64.00	83835.00	4361.28	6831.964
African American	10400	0.00	81.14	7.00	11.233
Asian	10399	0.00	36.50	1.39	2.583
Native American	10398	0.00	304.00	0.35	6.419
Rural	10419	0.00	100.00	56.34	31.662
Income	10213	20990.00	134609.00	47176.50	11821.414
Graduated High School	7781	2.50	100.00	85.21	9.125
College	10371	0.00	90.48	55.46	11.753
Children in poverty	10358	2.90	78.64	23.52	8.726
Female	10398	29.52	55.23	49.91	2.196
Hispanic	10398	0.34	96.25	10.84	16.360
Treatment	10043	0.00	1.00	0.28	0.447
Under 18	10400	5.15	41.09	22.34	3.390
Over 65	10400	5.13	56.31	17.58	4.494

Table 3			
Variable	Model1	Model2	
Intercept	4.39***	-11939.31***	
	(0.55)	(4338.80)	
Expansion of Medicaid	-0.01	-30.57	
	(0.02)	(249.39)	
Control Variables?	YES	YES	
County Fixed Effects?	YES	YES	
Year Fixed Effects?	YES	YES	

notes on STAR SYSTEM* :** Significance can be seen through the stars next to each coefficient. If the p-value is more than 0.1, the coefficient is then deemed insignificant and has no stars. For coefficients with p-values between 0.1 and 0.05, they receive one star " * " and are significant at the 10% level. For p-values between 0.05 and 0.01, two stars are used " ** " and the coefficient is significant at the 5% level. For p-values less than or equal to 0.01, three stars are given " *** " and are significant at the 1% level.

notes on sources: The data obtained for this model comes from https://www.countyhealthrankings.org/explore-health-rankings/measures-data-sources/county-health-rankings-model/health-outcomes/quality-of-life/poor-mental-health-days.

notes on MODEL: *Model 1* represents the regression against "county average poor mental health days." *Model 2* represents the regression against the mental health provider ratio

References

Burton Wayne N, et al. (2008). The Association of Worker Productivity and Mental Health: A
Review of the Literature. International Journal of Workplace Health Management.

Blunt Elson, et al. (2020). Public Insurance Expansions and Mental Health Care Availability.
Health Services Research.

Lambert David, Agger Marc. (1995). Access of Rural AFDC Medicaid Beneficiaries to Mental
Health Services. *Health Care Financ Rev.*

Levit Katherine, et al. (2013). Current and Future Funding Sources for Specialty Mental Health
and Substance Abuse Treatment Providers. *Psychiatric Services.*

Maclean Catherine, et al. (2019). Public Health Insurance and Prescription Medications for
Mental Illness. *B.E. Journal of Economic Analysis and Policy.*

McMorrow Stacey, et al. (2016). Medicaid Expansions from 1997 to 2009 Increased Coverage
and Improved Access and Mental Health Outcomes for Low-Income Parents. *Health
Services Research.*

Mental Health Information. (2022). National Institute of Mental Health.

Michael Hendryx. (2008). State Mental Health Funding and Mental Health System Performance.
Journal of Mental Health Policy and Economics.

Poor Mental Health Days. (2022). County Health Rankings.

Richard Frank, et al. (2003). Medicaid and mental health: Be Careful What You Ask For. *Health Affairs.*

Robinson Reed, et al. (2021). The Relationship Between State Mental Health Agency and Medicaid Spending with Outcomes. *Electronic Journal Center*.

Shirk Cynthia. (2008). Medicaid and Mental Health Services. *National Health Policy Forum*.

Appendix – SAS Code:

```
libname draft "/home/u53978732/1Main/Senior Project";

run;



proc import datafile = "/home/u53978732/1Main/Senior Project/Cleaned Data.xlsx"

        out = pre

        dbms = xlsx

        replace;

        getnames = yes;

run;quit;



/*  */



data post;

        set pre;

                treat = treatyear*treatgroup;

run; quit;
```

```
proc means data = post;

        var mhp mud;

run; quit;




/*  */

ods output ParameterEstimates=model1;

proc surveyreg data = post;

        class year county;

                model mud = afro asian nativ rural income ghrad college childpov

                                fem hisp treat u18 o65 singlepar county year/solution

        adjrsq;

run; quit;




ods output ParameterEstimates=model2;

proc surveyreg data = post;

        class year county;
```

```
        model mhp = afro asian nativ rural income ghrad college childpov

                                fem hisp treat u18 o65 singlepar county year/solution

    adjrsq;

run; quit;



proc means data = post;

        var mud mhp afro asian nativ rural income ghrad college childpov fem hisp treat u18 o65

        singlepar year;

        output out = summary;

run; quit;



/* graphs */

ods graphics / reset width=6.4in height=4.8in imagemap;



proc sgplot data=WORK.POST;

        title height=15pt "Mentally Unhealthy Days";
```

```
footnote2 justify=left height=6pt "1 and 0 are the treatment and control groups

respectivly - Bars represent the 99% confidence interval";

vline Year / response= mud group=treatgroup stat=mean limits=both limitstat=clm

    alpha=0.01;

yaxis grid label="Mentally Unhealthy Days";

keylegend / location=inside;

run;



ods graphics / reset;

title;

footnote2;



ods graphics / reset width=6.4in height=4.8in imagemap;



proc sgplot data=WORK.POST;

title height=15pt "Mental health provider ratio";
```

```
        footnote2 justify=left height=6pt "1 and 0 are the treatment and control groups

        respectivly - Bars represent the 99% confidence interval";

        vline Year / response=mhp group=treatgroup stat=mean limits=both limitstat=clm

                alpha=0.01;

        yaxis grid label="Population per 1 mental health provider";

        keylegend / location=inside;

run;



ods graphics / reset;

title;

footnote2;



/* */

ods excel file = "/home/u53978732/1Main/summary.xlsx";

proc print data = summary noobs;

run;

ods excel close;
```

```sas
ods excel file = "/home/u53978732/1Main/model1.xlsx";

proc print data = model1 noobs;

run;

ods excel close;




ods excel file = "/home/u53978732/1Main/model2.xlsx";

proc print data = model2 noobs;

run;

ods excel close;




/* stars 'n stuff */



data Table_long;

        length Parameter $50;

        set model1 model2 indsname=M;
```

```
if M="WORK.MODEL1" then Model="Model1";

        else if M="WORK.MODEL2" then Model="Model2";



if Probt le 0.01 then Star="***";

        else if Probt le 0.05 then Star="**";

        else if Probt le 0.1 then Star="*";

        else Star="";



Results=Estimate;

EditedResults=cats(put(Results,20.2),Star);

output;



Star="";

Results=StdErr;

EditedResults=cats("(",put(Results,20.2),")");

output;
```

```
          keep Model Parameter EditedResults;

          where StdErr ne 0;

run;




proc print data=table_long;

run;




Proc sort data=Table_long out=Table_long_sorted;

        by Model Parameter;

run;




Data Model1re(rename=(EditedResults=Model1))

        Model2re(rename=(EditedResults=Model2));


        set Table_long_sorted;
```

```sas
 if Model="Model1" then output model1re;

        else if Model="Model2" then output model2re;

     drop Model;

run;




data Table_wide;

     merge Model1re Model2re;

     by Parameter;



     if mod(_n_,2)=1 then Variable=Parameter;

     if Parameter="intercept" then Order=1;

        else if Parameter="male" then ORder=2;

        else if substr(Parameter,1,10)="raceethnic" then Order=3;

        else if substr(Parameter,1,5)="male*" then Order=4;

        else if Parameter="age" then Order=5;
```

```
        else order=6;

run;



ods excel file = "/home/u53978732/1Main/RegTable.xlsx";

proc print data = table_wide noobs;

run;

ods excel close;
```