**Problem Set: *Mandate-Based Health Reform and the Labor Market: Evidence from the Massachusetts Reform* (NBER Working Paper 17333) Jonathan T. Kolstad and Amanda E. Kowalski, problem set developed with Toby Chaiken and Megan Wilson**

Accompanying files available for download in a zipped file at <http://www.econ.yale.edu/~ak669/problem_set_all_files.zip>:

malabor\_07\_10\_15a.pdf (ONLY use this version of paper)

problem\_set.dta

problem\_set.do

problem\_set\_chart.xlsx

The data set given (problem\_set.dta) contains only the necessary variables, all labeled with their designated meaning.

You will also find an attached .do file, which contains code you will need to run. The code was written for Stata 14, and may need slight modifications for other versions of Stata. The code that is provided will produce the exact results found in the first two columns of Table 7. You will be asked to replicate the chart with slightly different specifications, and to use the coefficients to calculate figures that are not directly provided.

When using Stata, it is important to write .do files. Using a .do file allows you to easily spot errors in your code, make changes to your specifications, and track your previous work. You will see that the .do file provided is heavily commented. Commenting code is very beneficial, especially if you may return to the same project later or you are working closely with other people who need to look at your work. The comments in the code will explain each step of the process. Stata also has a help function. If you type “help” and then the command you are unsure about, Stata will explain what the command does and how to use it.

In the given code, there are a number of local macros. A local macro is a way to store a string of characters so you don’t have to repeat it if you will be using it throughout your code. For example, the first line of code reads:

local tag problem\_set

Later in the code, you will see the term `tag’ written, and in every place this is written, Stata understands it as the string “problem\_set.” This can be very useful because when making changes, you can change the string once and it will automatically change every place `tag’ appears. You’ll notice that one of the most useful places this is used in the given code is to designate a list of variables. By doing so, you only need to write out the entire list of x variables for the regression once, and this saves time and leaves less room for error.

If you run the code as is using the given data, you will find that the results from the resulting pset\_table\_orig.xml chart are identical to those in Table 7 of the paper.

**Empirical Exercises:**

Please complete problem\_set\_chart.xlsx and print it as your answers to exercises 1 through 3. This will be the first page that you submit. There is no need to provide any additional discussion. Instructions are given below.

1. **Coding additional regressions:** Repeat the given regressions only including people 25 or older but under 64.

After running the code, you will have an Excel table with regression coefficients. The calculation of the confidence intervals is outside of the scope of this problem set.

Complete the attached table (problem\_set\_chart.xlsx) and accompanying exercises and questions.

Exercises 2 through 5 *pertain to the additional regressions on the 25 to 64 population, not the originals provided in the .do file.*

1. Using the given coefficients from the first regression, calculate the wages at points B, D, and F from Figure 1 (graphical model). Wages at point A are normalized to zero. Use Excel formulas so that you could easily calculate the values for alternative regression coefficients. (Hint: You can check your work by applying your formulas to the coefficients from columns 1 and 2 of Table 7 of the paper. If your formulas are correct, you should attain the values reported in column 3 of Table 7. Use the same formulas on the new regressions to get the new values for column 3.)
2. Calculate the compensating differential (WF – WA) using the values that you found in the previous step.

[5 points]

1. Repeat steps 1 and 2 using the results from regression 2 and find the corresponding hours differential.

[5 points]

1. Given the calibrated values of s, d, ESHIAFTER, and b/τ in the Excel chart, fill in all remaining values, referring the paper for the formulas. Pay particular attention to Sections 3.3 and 4.3 while calculating these values.

[10 points]

**Questions:**

Please submit the answers to these questions in a document with your name on it. Please also include the names of any collaborators. Each question is worth four points.

1. Using the boxes below, identify the group(s) that were “treated” by the reform (for firms, treatment reflects the employer mandate). Which are control groups? (Classify each box as treatment or control).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Massachusetts | |  | |  | Non-Massachusetts | |
|  |  |  | |  |
|  |  | After | Before |  | |  | After | Before |
| Large Firm | ESHI | V | Y |  | ESHI | | V' | Y' |
| non-ESHI | X | Z |  | non-ESHI | | X' | Z' |
|  |  |  |  |  |  | |  |  |
|  |  | After | Before |  |  | | After | Before |
| Small Firm | ESHI | V'' | Y'' |  | ESHI | | V''' | Y''' |
| non-ESHI | X'' | Z'' |  | non-ESHI | | X''' | Z''' |

1. Assume that the V, X, Y, and Z terms and their counterparts with ‘ represent mean wages in the boxes above. Using only these terms, demonstrate how you would calculate β1 in the following equation (this equation is the same as equation 3 in the paper, but it does not have the individual fixed effects δi so that you can think of group means instead of wages for a given individual):

Yit= β1(MA\*ESHI\*After\*Large)it + β8(MA\*ESHI\*Large)it + β11(MA\*After\*Large)it + β12(ESHI\*After\*Large)it + β19(ESHI\*Large)it + β22(After\*Large)it +

β23(Large)it + *Фs*(Large)it +

β1e(MA\*ESHI\*After)it + β8e(MA\*ESHI)it + β11e(MA\*After)it +

β12e(ESHI\*After)it + β19e(ESHI)it + β22e(After)it +

+ *Ф*sit + εit

β1 can be referred to as the differences-in-differences (in-differences-in-differences) estimate.

1. Interpret β1 from the previous question in words.
2. Does β1 give an estimate of the compensating differential WF – WA? (Hint: in the empirical exercises, you calculated the compensating differential using the formula

(WF – WA)= β1 + β8 + β11+ β1e+ β8e.) Why or why not? (Hint: recall your answer to question 1).

1. Using regression coefficients from the equation above, write out the equation that you would use to predict wages for individuals in Massachusetts who work for large firms and have ESHI after the reform (V from question 1). What equation would you use to predict the wages for individuals outside of Massachusetts who work for large firms and have ESHI after the reform (V’)? What is the equation for V – V’? (Hint: In the equation, Фsit represents a vector of state fixed effects omitting one state outside of Massachusetts. You can refer to the Massachusetts state fixed effect with the notation ФMA. Outside of Massachusetts, assume that individuals are in the omitted state, so Фsit =0. Similarly, Фs(Large)it represents a vector of state fixed effects omitting one state outside of MA, interacted with the Large dummy variable. You can represent the Massachusetts component of the vector with the notation (MA\*Large). The only other terms that you will need will be β terms. Do not replace the coefficients with their estimated values from the empirical exercise.)

(Hint: Here are the first two parts of the answer.)

WMA, large, ESHI, after = β1 + β8 + β11 + β12 + β19 + β22 + β23 + (MA\*large) + β1e + β8e + β11e + β12e + β19e + β22e + ФMA

Wnon-MA, large, ESHI, after = β12 + β19 + β22 + β23 + β12e + β19e + β22e

1. What equation would you use to predict the wages for individuals in Massachusetts who work for large firms and do not have ESHI before the reform (Z)? What equation would you use to predict the wages for individuals outside of Massachusetts who work for large firms and do not have ESHI before the reform (Z’)? What is the equation for (Z - Z’)?
2. Using regression coefficients, write out the equation that you would use to predict wages for individuals in Massachusetts working at small firms without ESHI after the reform (X’’). What equation would you use to predict the wages for individuals in Massachusetts working at small firms without ESHI before the reform (Z’’)? What is the equation for X’’ – Z’’?
3. Repeat question 7 for people outside of Massachusetts (X’’’ and Z’’’).
4. Using your answers to questions 5 through 8, express the compensating differential,

WF-WA = (V – V’) – (Z - Z’) – {(X’’ – Z’’) – (X’’’ - Z’’’)}, in terms of coefficients.

1. Define WF – WA in words.
2. Why might WF – WA be the most reliable estimate of the compensating differential compared to others described in the paper? (See Table 1)
3. Based on Figure 1, we see that the expected compensating differential between WD and WA is negative, meaning we expect that people with ESHI before the reform will make less than those without ESHI before the reform. Empirically, we actually see the opposite; people with ESHI before the reform make more than those without ESHI before the reform. Without including individual fixed effects, why might this be the case? After including individual fixed effects, we also see a positive compensation differential. Explain why this might be occurring.
4. How do you expect the penalty-and-subsidy-inclusive valuation of health insurance obtained from the 25 to 64 population to compare to the penalty-and-subsidy-inclusive valuation of health insurance obtained from the full population? (Assume that the penalty and subsidies are the same for all.)
5. Using only the regressions that you have run already, how does the penalty-and-subsidy valuation of the 18 to 24 population compare to the penalty-and-subsidy-inclusive valuation of health insurance obtained from the full population, reported in Table 7 of the paper? Explain your answer using coefficients and confidence interval(s) from the paper (you do not need to calculate confidence intervals for this problem set). Is this what you expected?
6. In the Excel file (problemsetchart.xls), you are given annualized ρb, which is equal to the penalty for individuals who do not purchase health insurance after the reform. For national reform, the fine will be $3000. Using Excel, change ρb to $3000 for the 25-64 population. Holding b constant, calculate the new ρ. To transform the annual estimate, assume that individuals work 40 hours per week, 52 weeks per year. What effect does the higher penalty have on ρ and DWLm? Explain. What are the possible implications for national reform?
7. Based on the research and results of this paper, would you recommend a mandate-based reform or a tax-based reform? Support your argument with textual evidence, including numbers and/or figures.
8. Are there ways in which Massachusetts is similar or different from the country as a whole that makes results based on the Massachusetts reform more or less applicable to the entire country?
9. In Massachusetts, there was a high level of compliance with the reform legislation. If national reform had a lower rate of compliance, this could lead to higher prices in the market for insurance outside of employment. In this case, employees may value ESHI more because they are now facing a more expensive outside insurance option. Would a lower level of compliance increase or decrease distortion in the labor market due to the mandate?
10. Suppose the government decided to levy a tax and use the revenue to provide health insurance to all. If people recognize the linkage between the tax and the benefit provided, how does this policy compare to a mandate-based policy?
11. Name two ways in which this study builds on the model of Summers (1989).