

## Problem Set 12

### Payday Lending

Due: 11PM Eastern Time on Wednesday, December 11th

Econ 316: Industrial Organization

#### Honor code

*I am allowed to discuss the problem sets with others. However, I will write everything I submit, such as code, mathematical derivations, and final answers. I will not copy others. When I receive advice from others, I will cite them in my problem set.*

For example, if student named “Juana Diaz” gave me advice on a line of code, I will write “(Received advice from Juana Diaz)” on that line. Receiving advice does not affect your grade or how the grader thinks of you.

#### Question 0

OA: I followed the honor code on this problem set. (Answer Yes or No.)

OB: How much time did you spend on this problem set?

#### Overview: Payday Lending

Payday loans involve borrowing small amounts of money (generally \$100 to \$500) for short periods of time at high interest rates. A typical payday loan may be structured as a two-week loan with a \$15 per \$100 fee, which equates to an annual percentage rate (APR) of almost 400 percent.

Payday lending is a contentious topic. Some believe that payday lenders prey on the poor by charging high interest rates that further increase the debt burden of an already-indebted population. Others believe that payday lending serves a genuine need of the poor and cash strapped, so banning payday lending would negatively impact consumer welfare.

To shed some light on this argument, we will study the effects of payday lending on bankruptcies. You will put together the dataset for this problem set by obtaining data from different sources and then merging it into a data frame that you can use to estimate a difference-in-difference model. The goal is to put together state-by-year data on bankruptcies, average income, and payday lending law restrictions, and to then reshape those data into a form that we can use for the model. You already have data on payday loan restrictions in the file `Bhutta_Law_Restrictions.csv`. These data are adapted from Neil Bhutta's 2013 paper, "Payday Loans and Consumer Financial Health".

If we found that Pay Day Loan Restrictions reduced bankruptcies significantly, it would suggest that heavy handed regulation may be needed. If we found that Pay Day Loan Restrictions do not reduce bankruptcies significantly, it would suggest that lighter regulation in the form of nudges may be preferable.

### Question 1: Preparing the data

Using Bobst's website to access the Data Planet database we've downloaded 'Personal Bankruptcies from the Bankruptcy Statistics database shown as count' for all available US States and territories. These are data from the Administrative Office of the US Courts. We selected the years for which we have law restrictions data: 2006-2012.

This data has been saved as Bankruptcies.csv

Using [this link](#) to the Bureau of Economic Analysis' Regional Economic Accounts site, proceeding to Tools >> Interactive Data >> Regional Data GDP & Personal Income >> Begin Using the Data >> Annual State Personal Income and Employment we obtained 'Per Capita Personal Income' for all states. After cleaning up comments, and unnecessary columns, the data was saved as Income.csv.

1A) Import the bankruptcies csv into a jupyter python notebook, and follow the instructions on the template to reshape the data to a column of observations indexed by (Year, State). This is sometimes referred to as 'stacking the data'.

1B) Import Income.csv and follow the instructions on the template to reshape the data to a column of observations indexed by (Year, State).

1C) Import the payday lending law restrictions csv (Bhutta\_Law\_Restrictions.csv), and call the data Law\_Restrictions. Stack the data.

1D) Merge bankruptcies, income, and payday law lending restrictions into a single data frame.

1E) Obtain the summary statistics of bankruptcies and personal income for each year, and report the min, max, mean and median of each variable for 2011.

### Question 2

We will use difference-in-difference analysis to assess whether the effects of payday lending on the financial health of consumers is positive or negative. Specifically, using the data frame you created in part 1, we will assess the effect that restrictions on payday lending laws have on the number of bankruptcies. To obtain only the difference in bankruptcies generated by those laws, we will control for average state income, as well as the individual effects that each state and each year had on bankruptcies during the period for which we have data.

$$Y_{st} = \tau T_{st} + \beta \text{Income}_{st} + \gamma D_s + \lambda D_t + \epsilon_{st} \quad (\text{Equation 1})$$

where

$Y_{st}$  is the number of bankruptcies in state  $s$  at time  $t$

$T_{st}$  is a dummy variable which is equal to 1 if state  $s$  at time  $t$  has laws restricting payday lending and 0 if otherwise

$D_s$  is a vector of dummy variable (1 or 0) representing the state

$D_t$  is a vector of dummy variables (1 or 0) representing the year

2A) Law\_Restrictions is a dummy variable that is equal to 1 if state  $s$  at time  $t$  has laws restricting payday lending and 0 if otherwise, it is  $D_t$  in the equation above. Report how many states have laws restricting payday lending for each of the years using a graph.

2B) Using a scatterplot, plot the relationship between bankruptcy rates and payday lending restrictions for 2012, the latest year for which we have data. Also fit a regression line to the scatterplot.

2C) What is the slope of the 2012 relationship between lending restrictions and bankruptcy that you plotted in 2B? Report the regression coefficient.

2D) Would you interpret that correlation as evidence that payday lending laws *cause* bankruptcies to increase or decrease? Why or why not? (Hint: Are you concerned about omitted variable bias? What omitted variables might be relevant?)

2E) Use the hint in the template to perform a diff-in-diff analysis (i.e. estimate Equation 1 from above) without the Income control and report the coefficient for  $T_{st}$  (i.e. the dummy representing legal restrictions on payday lending). Is it statistically significantly different from zero?

2F) Now add Income as control variable. Does the estimated  $\tau$  coefficient change very much? Report the coefficients for Income and for  $T_{st}$ .

2G) Using your results from the regression in 2F, interpret the magnitude and statistical significance of the relationship between income and bankruptcies, as well as the relationship between payday lending restrictions and bankruptcies.

2H) Would you still be concerned with omitted variables bias now?

2I) As we covered in class, the CFPB finalized a payday lending regulation in October 2017 (link to press release). Define a nudge. Give a few bullet points explaining the key parts of the rule, and clarify the rationale behind the regulatory strategy used, incorporating both your empirical results from this problem set and our class discussion.