Group A

1. Compulsory Licensing: Evidence from the Trading with the Enemy Act

Compulsory licensing allows firms in developing countries to produce foreign-owned inventions without the consent of foreign patent owners. Have you watched the movie “dying to survive” (我不是藥神) two years ago? The movie is somewhat related to this topic. Every year countries such as Brazil, Thailand, and India have used this policy to procure life-saving drugs for millions of patients, who otherwise cannot pay for the original drugs produced by the patent-holders. However, in the policy realm, the compulsory licensing is a very controversial policy, some opponents to the policy raise concerns that compulsory licensing may discourage invention by the patent holder firms as well since most of the products produced under compulsory licensing are sold under market price. In this paper, authors analyze the welfare effect of this policy from a new perspective: whether compulsory licensing can also increase or discourage domestic invention. After World War I, the US Congress passed the “Trading with the Enemy Act”, allowing US firms to violate enemy-owned patents if they contributed to the war effort. After some amendment, by February 1919, all German-owned patents were systematically licensed to US firms, a de facto compulsory licensing to all those patents owned by German in other words. Authors try to test if the effect of this policy treatment will increase or decrease the invention in the same subclass of those German-owned patents, a typically differences-in-differences research design. The treatment variable “treat” in the data is the interaction term of the dummy variable indicating the pertinent subclass has at least one license (the “licensed\_class” variable) and the dummy variable of post-1919 (the “post-1919 dummy”).

You can find the variable list and definition to each variable below:

|  |  |
| --- | --- |
| Variable Name | Variable Definition |
| uspto\_class | subclass of patent (text) |
| grntyr | year of patent granted |
| count\_usa | number of patents by the US inventors |
| count\_france | number of patents by the France inventors |
| count\_germany | number of patents by the Germany inventors |
| count | number of patents |
| count\_for | number of patents by foreign inventors |
| count\_for\_2 | number of patents by foreign inventors squared |
| count\_noger | numberf of patents by the non-Germany inventors |
| count\_for\_noger | numberf of patents by the non-Germany foreign inventors |
| main | first half o f subclass id (text) |
| subcl | second half o f subclass id (text) |
| year\_conf | remaining lifetime of licensed patents |
| year\_conf\_2 | remaining lifetime of licensed patents squared (\*100) |
| count\_cl | number of licenses |
| count\_cl\_2 | number of licenses squared |
| licensed\_class | subclass has at least one Germany license |
| confiscated\_class | number of confiscated patents in class |
| class\_id | subclass of patent |
| treat | (subclass has at least one Germany license)\*post-1919 |
| year\_conf\_itt | remaining lifetime of enemy patents |
| count\_cl\_itt | number of enemy patents |
| post | post-1919 dummy |

Question 1) To replicate the empirical result in Table 2 in the paper.

Hint: a) Control variables in each regression include: the fixed effects of the year (of the patent granted) and subclass.

Question 2) Now write a paragraph to describe your replication results of table 2, do the results confirm the author’s hypothesis? Please use your own language to describe.

Question 3) Now let us confirm if the parallel time trend assumption of differences-in-differences can be satisfied in the authors’ setting. Now draw a line plot on the average number of patents by the US inventors by year with two lines corresponding to treatment and control groups (“licensed\_class”=1 for the treatment group, and “licensed\_class”=0 for the control group). Are these two lines parallel to each other pre-war (before 1918)?

Question 4) Now suppose you want to once for all take care of the parallel time trend assumption, how can you modify the regression to solve it? (Hint: utilize the subclass dummies and year variables)

Question 5) Given the “Trading with the Enemy Act” gives licenses for all German-owned patents to the US firms, it may discourage patent application for Germany firms in the US patent office. Check if this is true to replace the dependent variable in Table 2 using the numbers of patents by Germany inventors (the “count\_germany” variable). Report your result in a new table and describe it.

\*Question 6) (optional) Now replicate the regressions using an instrumental variable approach in Table 4.

For this optional question, you can get an extra 10% of scores on top of the full mark for the first five questions.