Data lab #7 – Immigration and IVs

Moser, Petra, Alessandra Voena, and Fabian Waldinger. 2014. "German Jewish Émigrés and US Invention." American Economic Review, 104 (10): 3222-55.

Question for discussion: How did the arrival of German Jewish immigrants influence US invention?

Deadline: Friday, Dec. 15, 9pm. No Datacamp assignment for this lab.

Introduction

How do changes in the inflow of high-skilled immigrants influenced US innovation? Does domestic invention fall or increase in response to the influx of high-skilled foreign workers? In today's lab you will answer these questions using an important historical episode of immigration. In 1933 Adolf Hitler dismissed all Jewish scientists from German universities. A total of 93 professors lost their jobs; 26 of them moved to the United States, where historians say they "revolutionized" chemical science.

As in previous labs (e.g., our lab on compulsory licensing), we will use patents to define research fields that were differentially affected by a policy change (here, the change in immigration), and compare changes in patenting across fields after the policy to investigate whether US innovation increased in response to an increase in innovation (and if so, by how much). The patented inventions of German university professors allow us to determine their research fields (using the USPTO's system to assign each patent to a specific "class").

To evaluate changes in invention, we will compare changes in patenting by US inventors in fields (defined by USPTO classes) that received an émigré (or a larger number of émigrés) with changes in patenting in fields of other German chemistry professors who remained in Germany. Your data cover the number of US patents (per year and research fields) for all fiends in which German chemists were active inventors.

Instructions

1. In your introduction, motivate your research question. Explain why it is important to understand how changes in the arrival of high-skilled immigrants influence the productivity of US inventors.

2. Let's start with some basic summary statistics:

    a. How many classes include at least one patent by a dismissed scientist? How many of those classes include at least one patent by a dismissed scientist who moved to the United States?

b. Graph the average number of patents in classes with or without émigrés.

c. Describe the figure by comparing changes in US invention in the fields of émigrés and in the fields of other German chemists

3. Estimate regression models to replicate columns (1) and (5) in Table 2 of Moser, Voena and Waldinger (2014) and describe the result of that regression.

a. What does it tell us about the effects of the émigrés on US invention?

b. And what has to be true for the coefficients to estimate the causal effect of the émigrés on US invention?

4. Explain why your OLS estimates from 3) may be biased. Hint: Are dismissed professors who moved to the United States a randomly selected subset of the dismissed professors? Explain how émigrés may be positively or negatively selected.

5. Run the IV regression in Table 4, columns (1) and (3).

a. What are the two characteristics of an ideal IV?

b. Why are the classes by all dismissed scientists a good instrument for the classes of émigrés?

c. Report the coefficients and the R^2 from the first stage. Is your instrument a good predictor for whether a class had émigrés patents?

d. Describe your IV estimates and compare them with the OLS estimates in equation 3).

e. Why are the IV estimates different from the OLS?