Economics of Migration

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Basic Concepts of Economics

Correlation vs. Causation

- Most of this discussion is based on Acemoglu et al. (2016, pp. 64-67).
- In economics typical questions such as the following can arise: does an increase in the demand for a good increase its price? Does an increase in the number of immigrants reduce the wage of native workers? Does an increase of immigrants increase the crime rate?
- These questions can be reformulated as: does an increase in the demand for a good cause an increase its price? Does an increase in the number of immigrants cause a reduction of the wage of native workers? Does an increase in the number of immigrants cause an increase of the crime rate?

Basic Concepts of Economics

Correlation vs. Causation

- Economic models typically suggest causal relations among variables.
- Causation occurs when one thing directly affects another (Acemoglu et al., 2016, p. 65)
- Correlation means that there is a mutual relationship between two things - as one thing changes, the other thing changes as well (Acemoglu et al., 2016, p. 65).

Basic Concepts of Economics

Correlation vs. Causation

- The ideal situation to establish the existence of a causal effect of one thing on another is a laboratory experiment: if a let a ball roll and hit another ball, I can claim that the movement of the former causes the movement of the latter.
- Unfortunately, in real-life situations it is difficult to recreate experiments of the sort one can run in a laboratory.
- Correlation can imply causation, but there can be correlation without causation
- Example: in American high schools, students who take music courses score higher in SAT (Scholastic Assessment Tests) than students that did not take music courses.

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Correlation vs. Causation

- Does this mean that taking music courses makes you a better student? That is, does that imply that studying music has a causal effect on your overall capacities as a student (reading, writing, etc.)?
- It is possible, but another explanation can exist: "being a good student" makes more likely that one does both things, i.e. s/he has good SAT scores and enrolls in music classes.
- That is, there might be a third factor that explains the two characteristics: (i) enrolling in music schools, ii) having good SAT scores.
- Correlations are divided into three categories: i) positive correlation, ii) negative correlation, and iii) zero correlation.

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Correlation vs. Causation

- Positive correlation implies that two variables tend to move in the same direction. For example, surveys reveal that people who have a relatively high income are more likely to be married than people who have a relatively low income (that is: income $\uparrow$, probability of marriage $\uparrow$). In this situation we say that the variables of income and marital status are positively correlated.
- Negative correlation implies that the two variables tend to move in opposite directions - for example, people with a high level of education are less likely to be unemployed (that is: education $\uparrow$, probability of unemployment $\downarrow$). In this situation we say that the variables of education and unemployment are negatively correlated.

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Correlation vs. Causation

- When two variables are not related, we say that they have a zero correlation. The number of friends you have likely has no relation to whether your address is on the odd or even side of the street.
- There are two reasons why correlation between two variables might not imply a causal relationship: 1. omitted variables 2. reverse causality
- An omitted variable is something that has been left out of a study that, if included, would explain why two variables are correlated.
- In the case described above, it might be the case some individual characteristics that make someone a good student (i.e. staying focused, working hard, etc.) make these student score high in SAT and increase the probability they enroll in music schools.

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Correlation vs. Causation

- Reverse causality is the situation in which we mix up the direction of cause and effect.
- For example, wealthy people are often healthy people. It might be the case that, having higher wealth they can spend more in health-improving goods and services (better food, the gym, etc.) so that wealth $\implies$ health.
- But it may also be the case that, because they enjoy a better health, they can accumulate more wealth (being in good health makes someone a better worker, encourages to invest for the future, e.g. by studying, etc.), so that health $\implies$ wealth.

Basic Concepts of Economics

Correlation vs. Causation

- Experiments are not only run in laboratories. It is also possible to run an experiment on individuals outside the lab.
- Researchers usually create a treatment (test) group and a control group.
- Participants are randomly assigned to participate either as a member of the treatment group or as a member of the control group - a process called randomization.
- Randomization is the assignment of subjects by chance, rather than by choice, to a treatment group or to a control group.

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Correlation vs. Causation

- Why randomly? Because, ideally, the treatment group and the control group should be identical, except along a single dimension (the treatment) that is intentionally varied across the two groups. The impact of the treatment is the focus of the experiment.
- If you let the individuals to choose whether to be in the treatment or the control group, there is a selection problem. I.e. some factors that make an individual choose to be in the treatment or the control group, might be correlated with the treatment.

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Correlation vs. Causation

- So, when the researcher wants to measure the effect of the treatment, this effect cannot be precisely measured because it can be confused with the effect of the factors that make one individual to choose the treatment group. These factors are actually called "confounding factors".
- This method has been borrowed by economics (and other social sciences) from medicine, where a typical focus is on the effect of a new drug.
- In this case, to assess the validity of a new drug, it is given to a treatment group and not to a control group. Ideally, the only difference among the groups should be having received the drug.

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Correlation vs. Causation

- If we do not have the budget or time to run an experiment, how else can we identify cause and effect? One approach is to study historical data that has been generated by a "natural" experiment.
- A natural experiment is an empirical study in which some process, out of the control of the experimenter, has assigned subjects to control and treatment groups in a random or nearly random way.
- An important natural experiment in migration studies is the case of the "Marielitos", i.e. the Cubans who left Cuba to migrate to Florida for an unexpected decision of Fidel Castro in 1980 to allow Cubans to leave the island from the Mariel port.

Basic Concepts of Economics

Regression Analysis

- This section is largely based on Borjas (2016, pp. 12-19)
- Econometrics is the application of statistical techniques to study relationships in economic data.
- In the economic analysis of migration, the kind of questions we will want to answer require to identify causal effects (although uncovering correlations can also be interesting and useful), which implies establishing the the direction of the effect on one variable on another and the the size of this effect.

Basic Concepts of Economics

Regression Analysis

- Do a flow of immigrants cause a reduction in the wage of native workers? If yes, by how much?
- The main statistical technique used in econometrics is regression analysis.
- For example: it is reasonable to assume that schooling positively affects the wages the someone will earn.
- This effect could be summarized by an equation such as:

$$log\ w = \alpha + \beta s \tag{1}$$

where w is the (hourly) wage, and s is the number of years of schooling (the use of logarithms (log) allows to interpret the coefficient β as a percentage change in wages)

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Regression Analysis

- The wage *w* is the dependent variable, while the schooling years *s* are the independent variable.
- α and β are parameters to be estimated. α indicates the wage of an individual with zero years of schooling, while the slope β gives the change in the log wage associated with a one-year increase in schooling

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Regression Analysis

- The connection between years of schooling should look like this:

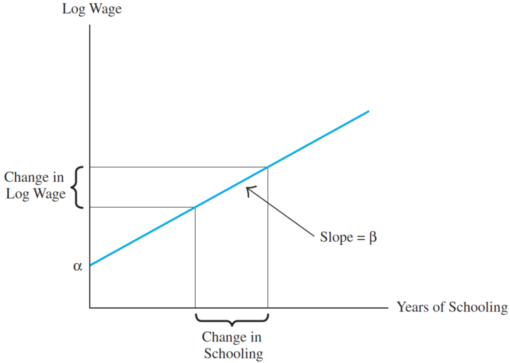

Figure 1: Relationship between years of schooling and wages. Source: Borjas (2016)

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Regression Analysis

- The typical econometric analysis implies the collection of data on a sample of individuals regarding their wage and the number of years of schooling.

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Regression Analysis

- When we have a sample of data we can do a scatterplot (or *scatter diagram*):

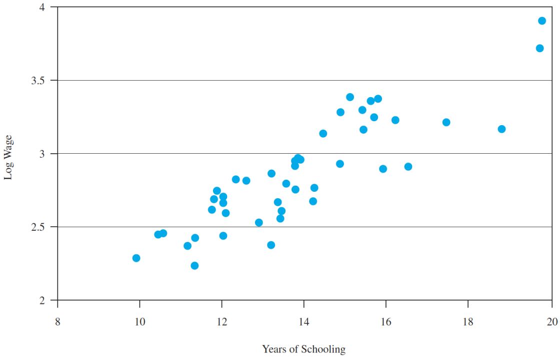

Figure 2: Average years of schooling and wages for 45 occupations in 2001 in the US. Source: Borjas (2016)

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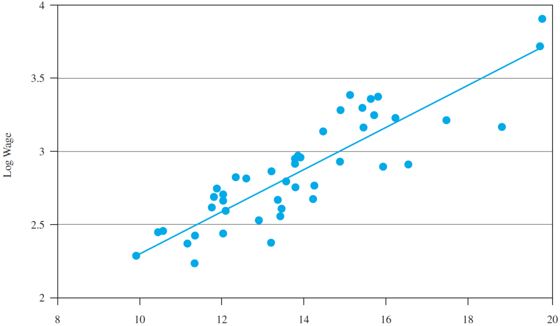
Regression Analysis

- The objective of regression analysis is to find the best line that goes through the scatter diagram.
- The regression line is the line that best summarizes the data.
- The graphical representation of the regression line is the following:



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Regression Analysis

- The parameters α and β are estimated, in order to generate the regression line that better represents the (linear) relationship between the variables (typical estimation method: OLS, ordinary least squares).
- If we substitute the estimated values into Eq. (1), we obtain:

$$log\ w = 0.869 + 0.143s \tag{2}$$

- The interpretation of the coefficients is the following: the (log) wage with zero years of education is 0.869 (corresponding to an hourly wage of 2.38 $, w = exp(0.869)) .

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Regression Analysis

- The estimated slope is positive, indicating that the log wage is higher in occupations where workers are more educated so, actually: education $\uparrow$, wage $\uparrow$.
- The 0.143 slope implies that each one-year increase in schooling of workers in an occupation raises the wage by approximately 14.3 percent.

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Regression Analysis

- The estimated coefficients are imprecise: data come from a sample (we do not observe the whole population), there can be measurement errors, etc.
- In general, we can assess the precision of the estimates by their standard errors: they represent the margin within which our estimate lies. So, to be precise, an estimation implies the computation of a value of a coefficient and an interval that tells us by how much that value can differ from the estimate.
- The margin of error that is used commonly in econometric work is twice the standard error.

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Regression Analysis

- In addition, with the standard errors we can assess the significance of the estimate.
- The problem is the following: once we estimate parameter values, we would like to know how likely it is that they represent the true (unobserved) values characterizing the population.
- Alternatively, these values may depend on the sample we used, which might not be representative of the population, and indicate a relationship that perhaps is non existing.
- Econometric estimates allow us to make claims such as: "the estimated coefficient is significantly different from zero".
- This means that we can be quite confident that the estimated relationship is actually in the data, and does not depend on chance.

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Regression Analysis

- Finally, the regressions that are typically estimated are multiple regressions. That is, the number of independent variables is greater than one.
- If we assume, for example, that hourly wage can depend also on the share of women employed in a sector, we would like to estimate a relationship like this:

$$log\ w = \alpha + \beta s + \gamma p \tag{3}$$

  where p is the percentage of female workers in an occupation.
- The interpretation of the coefficient in this case is the following: β indicates the marginal effect of a year of schooling on (log) wages, given a certain value of p; γ indicates the marginal effect of a percentage point of female occupation (log) wages, given p

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Regression Analysis

- A word on correlation and causation: ideally, relationships such as those in Eqq. (1) and (3) should represent the causal effect of s and p on wages.
- For this to be true, variations of s and p should be exogenous: their variation, in particular, should not be related to changes in wages. In other words, their variation should be caused by something that does not, directly or through something else, affect the wages.
- If we are not sure that this is the case, the estimated parameters should be interpreted with some caution as correlations

Bibliography

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Borjas, G. J. (2016). Labor Economics. McGraw-Hill.