

ECO375 Tutorial 1

Wooldridge: Chapters 1 and 2

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ECO375 Tutorial 1

Welcome to your first tutorial for ECO375!

Today's coverage:

- Chapter 1, #2 (in slides)
- Chapter 2, #9 (on the board)
- “Partialling out” proof in Appendix 4b (on the board)
- If time permits, Chapter 2, #11 (in slides)

Check out my website before each weekly tutorial to get access to slides, datasets and do-files: matthewtudball.com

A justification for job training programs is that they improve worker productivity. Suppose that you are asked to evaluate whether more job training makes workers more productive. However, rather than having data on individual workers, you have access to data on manufacturing firms in Ohio. In particular, for each firm, you have information on hours of job training per worker (*training*) and number of non-defective items produced per worker hour (*output*).

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i) Carefully state the *ceteris paribus* thought experiment underlying this policy question.

Suppose that there are two firms, A and B, which are identical in every respect except that firm A provides one hour of job training more per worker than firm B. By how much would firm A's output differ from firm B's?

ii) Does it seem likely that a firm's decision to train its workers will be independent of worker characteristics? What are some of those measurable and unmeasurable worker characteristics?

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It is unlikely that a firm's decision to train its workers will be independent of worker characteristics. We can think of several examples in which independence will not hold.

- **Firms which observe that their workers are less productive may choose to offer more hours of job training per worker.**
- **Workers with certain characteristics may be attracted to firms which offer more hours of job training.**
- **Firms may discriminate who receives job training based on age, gender or race and these demographic characteristics may vary across firms.**

iii) Name a factor other than worker characteristics that can affect worker productivity.

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We can think of several firm characteristics that may affect worker productivity.

- **Firms with better technology and more capital may produce more output per worker, holding worker characteristics equal.**
- **Firms with better managers may also have more productive workers.**

iv) If you find a positive correlation between *output* and *training*, would you have convincingly established that job training makes workers more productive? Explain.

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No, unless the amount of training is randomly assigned across firms. As we showed in ii) and iii) there are several channels through which training and output may be positively correlated even if job training has no direct effect on worker productivity.

Suppose you are interested in estimating the effect of hours spent in an SAT preparation course (*hours*) on total SAT score (*sat*). The population is all college-bound high school seniors for a particular year.

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i) Suppose you are given a grant to run a controlled experiment. Explain how you would structure the experiment in order to estimate the causal effect of *hours* on *sat*.

We would want to randomly assign the number of hours allocated to each student in the preparation course. We would then collect data on SAT scores from those students, yielding a dataset of the form $\{hours_i, sat_i : i = 1, \dots, n\}$. To minimise the variance of our estimate we would want to allow for as much variation in $hours_i$ as possible.

Chapter 2 #11

ii) Consider the most realistic case where students choose how much time to spend in a preparation course, and you can only randomly sample *sat* and *hours* from the population. Write the population model as

$$sat = \beta_0 + \beta_1 hours + u$$

where, as usual in a model with an intercept, we can assume $E(u) = 0$. List at least two factors contained in u . Are these likely to have a positive or negative correlation with *hours*?

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- **If we think students with higher native intelligence think they do not need to prepare for the SAT, then ability and hours will be negatively correlated.**
- **Family income would probably be positively correlated with hours, because higher income families can more easily afford preparation courses.**

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iv) In the equation from part (ii), what is the interpretation of β_0 ?

β_0 is the average SAT score among students who did 0 hours in the preparation course.