SAMPLE IN-CLASS ACTIVITIES

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As I describe in my Statement of Teaching Philosophy, I strongly believe that students learn best from active engagement with new concepts and methods. To that end, as a graduate student instructor I prepared a number of in-class activities designed to guide students through that material I was teaching. These activities were intended to help them think critically about definitions and graphical techniques; while some elements of the activities are more straight-forward, others were purposefully quite challenging in that they required students to think about the material in a new way.

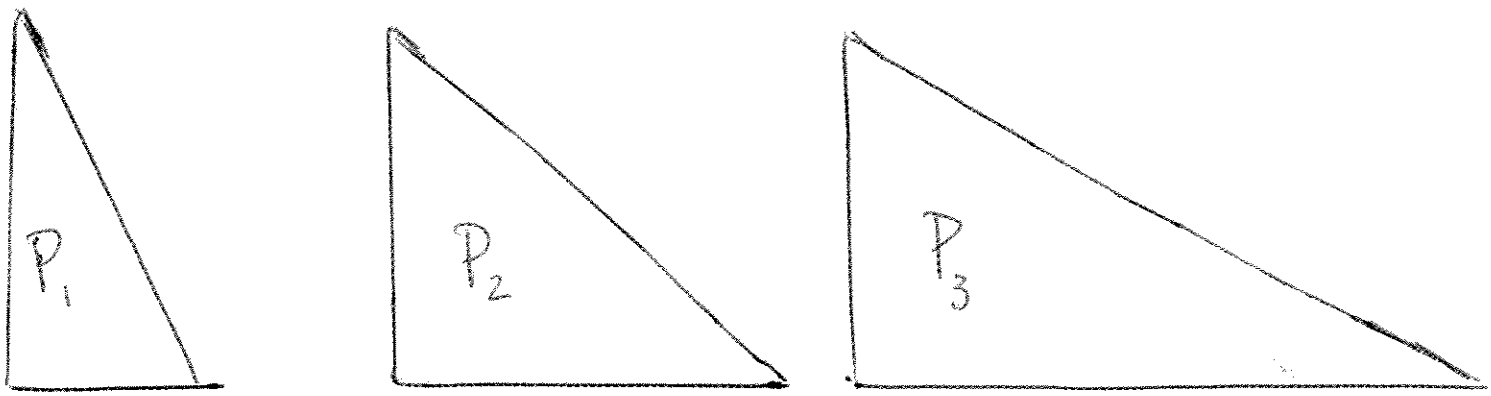
Included here are three examples of such in-class activities that I created, drawn from the two semesters I have spent teaching undergraduates and a workshop on impact evaluation for government employees and NGO representatives in Nigeria.

I prepared the first activity for undergraduate students in intermediate microeconomic theory. It deals with the income and substitution effects of price changes, the difference between Marshallian & Hicksian demands, compensating variation, and inferior goods. Ultimately, the students put all these concepts together in the Slutsky Decomposition, which by this point they should be able to draw.

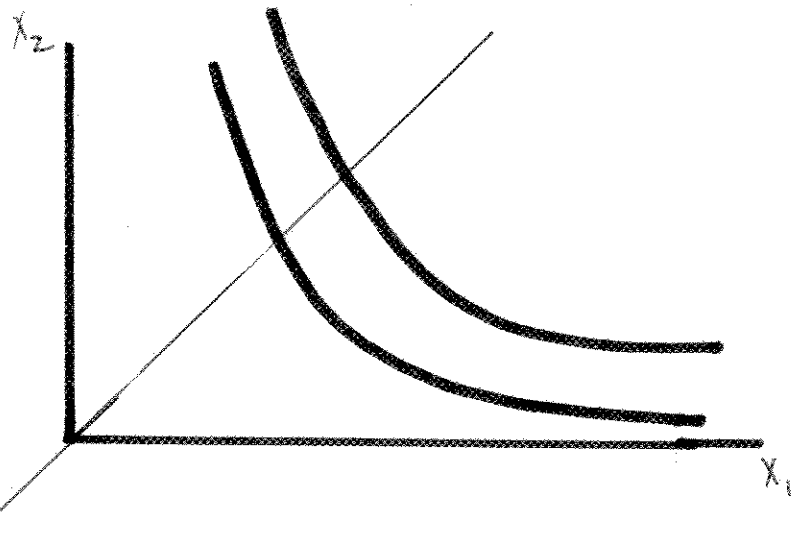
The second activity was created for undergraduate students in econometrics and covers interactions between a continuous variable and an indicator variable in order to estimate heterogeneous effects. The theory had been introduced in lecture, but the activity took a different spin by asking students to relate hypothetical data (depicted in scatter plots) to the notation in a model with interactions. This clarified which variables would determine the intercepts and which would determine the slopes in a model with heterogeneity.

As an example of an activity I have planned for students from other disciplines, I am including a set of discussion questions that I wrote for a short session on regression discontinuity design at a workshop on impact evaluation methods. In this case, the students were employees of NGO's that do development projects.

The following worksheet refers to three price ratios, depicted below. When I used this worksheet in class, I gave each group of students a set of the price ratios cut out of heavy paper. The worksheet requires them to move the price ratios around on top of the indifference map on the worksheet, and on the second page they need to be able to situate the right angle of one of the price ratios in a particular spot in order to produce a budget set that corresponds to a lower income with the same price ratio.



DEMANDS
EEP 100 SECTION 10/13 & 10/16



1. On the indifference map above, find the Marshallian demands for the P_3 budget constraint. Label them X_1^* and X_2^*.

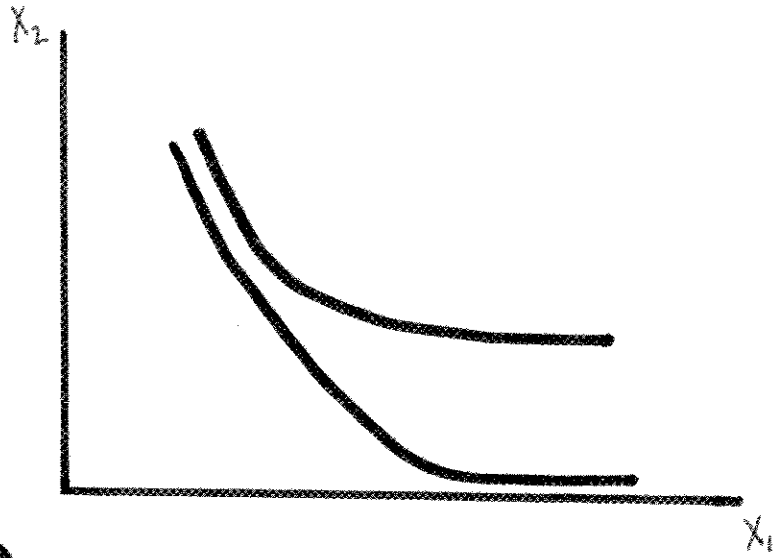
2. Now find the Marshallian demands for the P_2 budget constraint. Label them X_1' and X_2'. Explain how prices have changed and what this means for the budget set. What has happened to the quantities demanded as a result?

Now we will decompose the difference between X_1^* and X_1' into a substitution effect and an income effect.

3. Begin with the substitution effect – if the consumer were compensated for the change in prices with an change in the budget constraint so that she remained on her original indifference curve, how much of each good would she now demand? Label these quantities X_1^{**} and X_2^{**}. What are these quantities called (in the vocabulary of this course)?

4. What would the change in income have to be for the consumer to remain on her original indifference curve following the change in prices? What is this amount called (in the vocabulary of this course)?

5. Label the substitution and income effects on the X_1 axis. Which direction does each effect go? Explain this intuitively.



6. Find the Marshallian for X_1 on the indifference map above using the P_3 budget constraint; label it X_1*. Now, using the same price ratio, but a smaller income (put the bottom-left corner of the budget constraint on the target), find the new Marshallian demand for X_1. What type of good is this? What is the formal definition of such a good?

7. Find the Marshallian demand for X_1 using the P_2 budget constraint and label it X_1'. Explain how prices have changed and what this means for the budget set. What has happened to the quantities demanded as a result? Do you notice anything unusual?

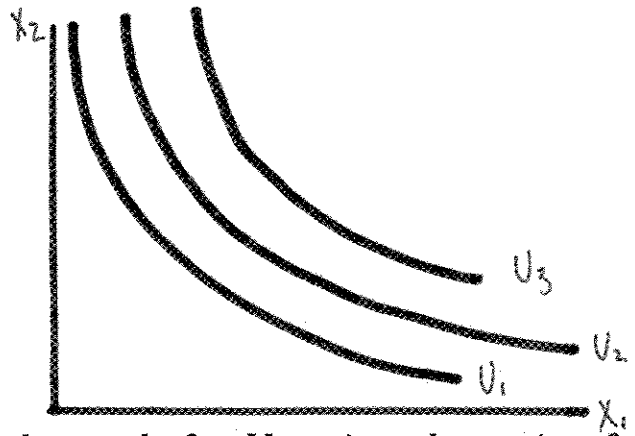
8. Find the Hicksian demand for X_1 using the P_2 budget constraint and label it X_1**.

9. Following the same method used in the previous exercise, label the substitution and income effects. Which direction does each effect go? How do their relative sizes compare? What is the end result in terms of the change in Marshallian demand for X_1 following the change in P_1?

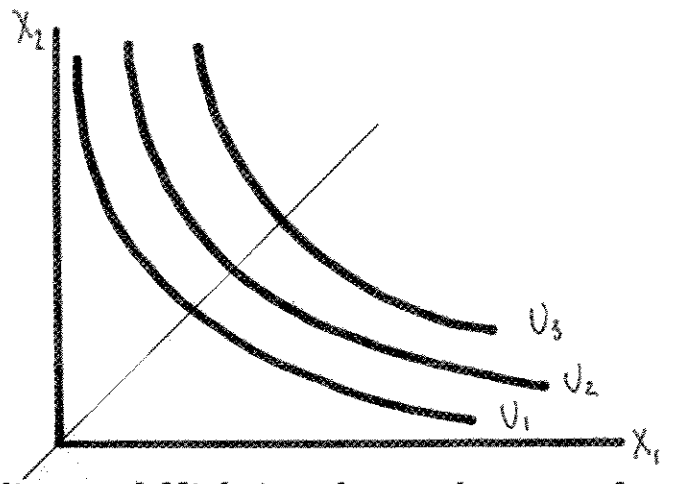
10. Write down the Slutsky decomposition. Relate your conclusions from these two graphical analyses to the math. What can you say about the signs and relative sizes of each of the components of the Slutsky decomposition for the two sets of preferences you've been dealing with?

Demand Curves

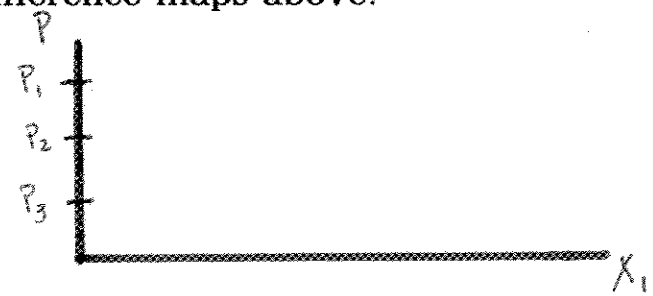
1. Find Marshallian demands for X_1 using the P_1, P_2, and P_3 budget constraints. Label them X_1^*, X_1^{**}, and X_1^{***}, respectively.



2. Find Hicksian demands for X_1 using the ratio of prices given by the P_1, P_2, and P_3 budget constraints. Hold utility constant at U_2.



3. Draw Marshallian and Hicksian demand curves for X_1 using the data from the indifference maps above.



4. How do the two demand curves compare? How does this relate to the analysis of substitution and income effects you just did?

5. Can Marshallian demand curves ever slope upwards? Can Hicksian?

EEP 118 Section 11/7/2007
Clair Null

Sick Leave During Flu Season

Suppose you have an internship as the Tang Center's econometrician. The Director of the Tang Center is re-evaluating the flu clinics and has asked you to identify the factors that put workers on Berkeley's campus at risk of getting sick and needing to take sick leave during the flu season. Your conclusions will help the Director decide whether Tang should even distribute flu shots at all, and if so whether there should be special flu clinics or subsidies for certain groups of workers next year. The Director hasn't given you any data yet, but you can begin by thinking about what sort of evidence you want to provide, what models you will want to estimate, how you will interpret them, and what tests you will need to do.

Data The Director is going to provide you with the employment records for a random sample of Berkeley employees that include the # of days of sick leave taken last year and an estimate for how many people the employee comes into contact with during her/his workday. You will also get health records for the same people that indicate whether or not they got a flu shot last year and their age.

Do flu shots work? Suppose you begin by testing the null hypothesis that workers who got flu shots took the same amount of sick leave on average as those who did not. Describe how you could do this same test in a regression format (write the regression model you would use and point out what part of the regression output you would base your conclusion on).

You've been told that people who come in contact with many other people are more likely to get sick, as are older people. Write a regression model that will tell you whether or not a flu shot keeps a person healthier, controlling for these other two factors.

Are flu shots equally beneficial for everyone? Documenting that flu shots work is relatively straightforward. The next step is to identify the workers who benefit most from flu shots. Write a regression model that will allow you to answer the following question: Do workers who come in contact with more other people during their workday benefit more from flu shots than those who work more independently?

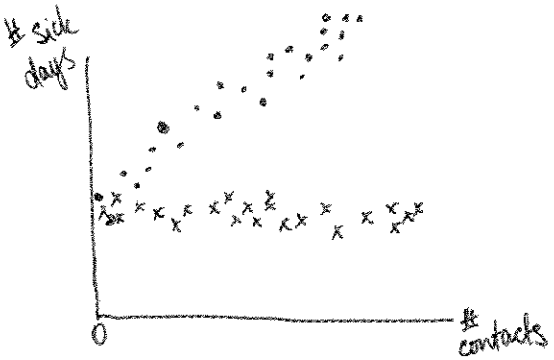
Double-check: Does your model allow you to compare the difference in sick days for people who did & did not get vaccinated while holding the # of contacts equal? Which parameter is this in your model? Does your model allow you to compare the difference in sick days for people who come into contact with more other people while holding vaccination status equal? Which parameter is this in your model? Which parameter tells you if flu shots are more beneficial for those who come into contact with more people?

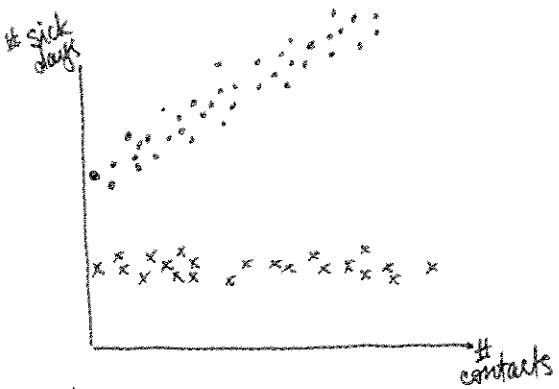
Suppose you estimate the following model:

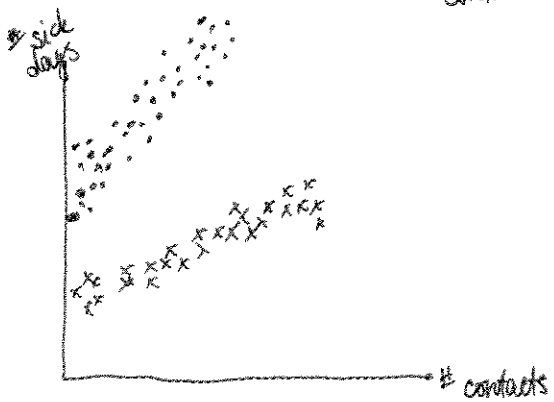
$$sickdays = \hat{\beta}_0 + \hat{\beta}_1 contacts + \hat{\beta}_2 age + \hat{\beta}_3 shot + \hat{\beta}_4 (shot \times contacts)$$

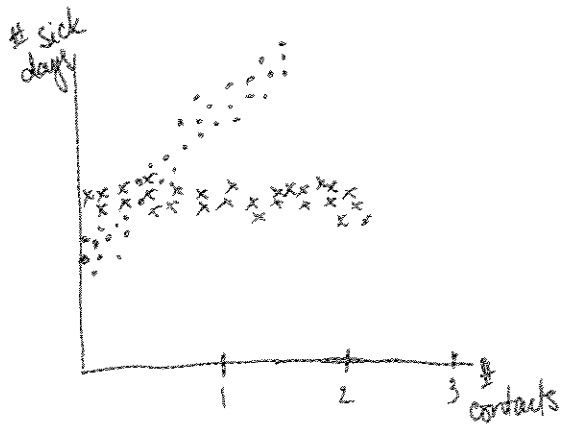
What would you expect for the sign and significance of $\hat{\beta}_0$, $\hat{\beta}_1$, $\hat{\beta}_3$ and $\hat{\beta}_4$ in the following cases? Explain in words what these cases mean. (For the moment, ignore the effect of age and just think about the relationship between the number of workday contacts, flu shots, and sick leave.)

x shot = 1
• shot = 0





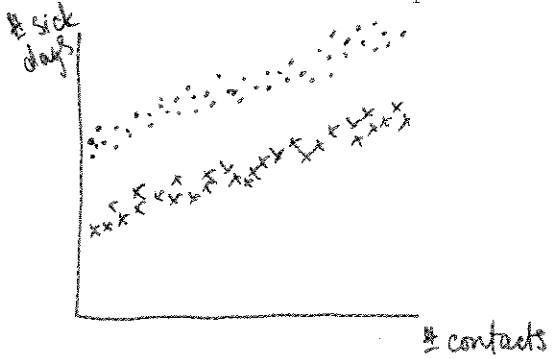




Suppose you left out the flu shot dummy variable and estimated the following model:

$$sickdays = \hat{\beta}_0 + \hat{\beta}_1 contacts + \hat{\beta}_2 age + \hat{\beta}_4 (shot \times contacts)$$

Illustrate what you would get from your regression if these were your data (again, ignoring age) - just draw predicted values from the regression right on top of this graph. Hint: How many best-fit lines does the model above make? How do the intercepts for these lines compare to one another?



What would you expect in terms of sign and significance for $\hat{\beta}_0$, $\hat{\beta}_1$, $\hat{\beta}_3$ and $\hat{\beta}_4$ if you had the data in the picture above and estimated the model without the flu shot dummy variable? How would your results compare to what you would get with these same data if you estimated the model with the flu shot dummy variable included? Is it a mistake to leave that variable out?

Review & Extension Questions

1. Is it possible to find that the parameter on the flu shot variable is insignificant when you exclude the other controls but significant when you include them?

2. If so, what would explain this (think back to the reasons why we might include more variables in the regression)?

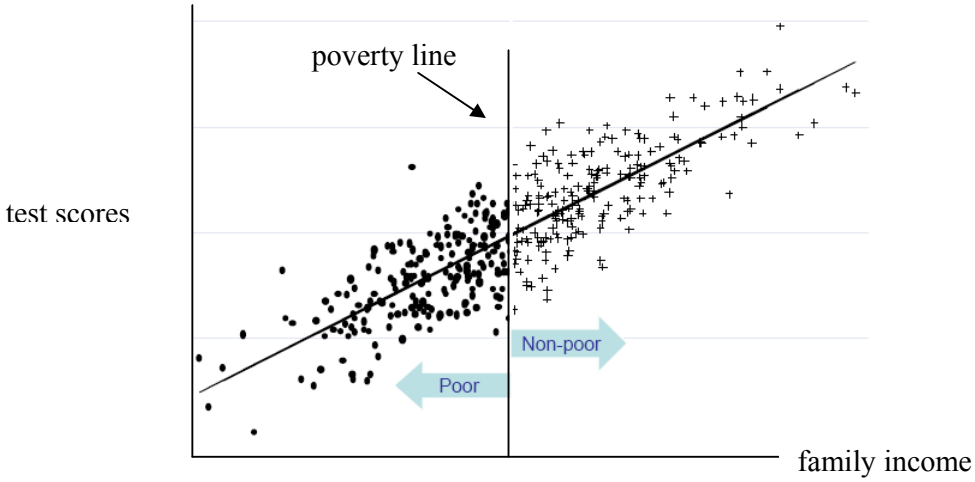
3. Suppose that rather than having the continuous variable for number of workday contacts you had a variable that categorized the worker's job as 1="very social" (e.g. professors who teach large classes or the receptionist at the financial aid office), 2="somewhat social" (e.g. the librarian in the maps library), or 3="not social" (the night shift of the custodial staff who work alone in the buildings). How would you change the regression model from what we were using above?

4. Review 2 different (but closely related) ways that you could test to see if the function that predicts sick leave is totally different for people who get flu shots versus those who don't. What regressions would you need to run and which parts of the output would you use to calculate the test statistic for both methods?

5. How could you test whether the number of contacts or age is more important in determining how beneficial a flu shot is? Hint: You'd want to somehow compare the effect of flu shots for different numbers of contacts to the effect of flu shots for different ages so you'd need both of these in your model (2 interactions).

REGRESSION DISCONTINUITY DESIGN:
CASE STUDY OF A SCHOLARSHIP PROGRAM

Suppose you are interested in evaluating the impacts of a city-wide scholarship program. Scholarships are awarded on the basis of family income - all students from families whose income is below the poverty line are awarded the grant to purchase supplies. Before starting the survey, the organization that provides the grants analyzed school records and found the following relationship between family income and test scores.



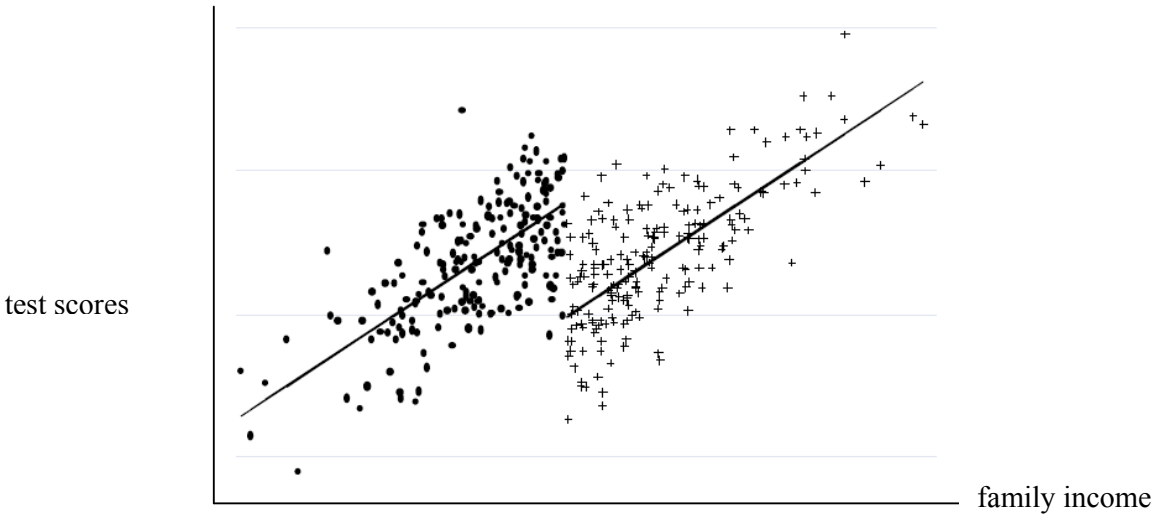
Discussion Questions:

1. In general, are non-poor students (who don't get the scholarship) a good counterfactual for the poor students who get the scholarship? In what ways does the daughter of a banker (very rich) differ from the daughter of a maid (very poor)?

2. What if you compared the sons of an accountant (medium rich) and a bus driver (medium poor)? Do you think they would be more similar than the banker & maid's daughters are?

3. Ideally, we'd like to compare students from the same family income levels who did and did not get the scholarship. Are there any such students? How close to this best-case situation can we get? (keep in mind scholarships are awarded only to students below the poverty line)

Suppose that at then end of the scholarship year, you saw the following trends in test scores:



4. Can you tell the effect of the scholarship program based on the graph above? How would you measure it?

5. What if you hadn't known what the original relationship between family income and test scores was, but instead only had the data from after the scholarship year. Would that be enough for you to measure the impact of the program using this method? Why or why not?