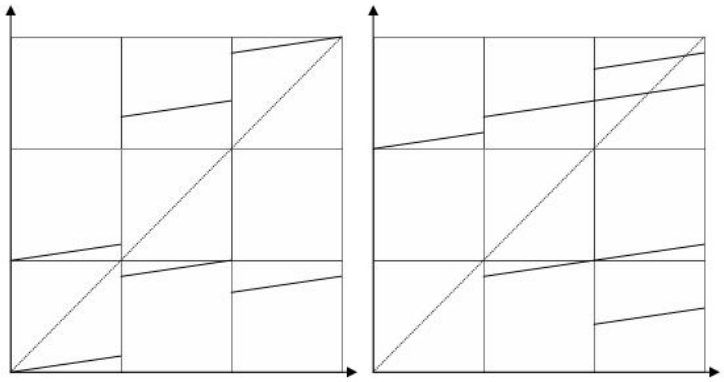
Problem 1: Poverty traps

In Banerjee-Newman (JPE, 1993) model, the time evolution of wealth is as follows:



Denote $p_u(t)$, $p_m(t)$, $p_l(t)$ shares of upper, middle and lower class in population. Draw a phase diagram in p_u, p_l space. Given parameters $q \in (0,1)$, $q' \in (0,1)$ and $1 - q + \frac{q'-q}{\mu} > 0$, find equilibrium (equilibria), check for cycles and determine basins of attraction. Describe policy implications.

Problem 2: Real exchange volatility

In a recent paper, Aghion, Bacchetta, Ranciere, and Rogoff show that exchange rate volatility reduces economic growth in countries with low level of financial development. In countries with developed financial institutions, there is no significant negative effect of volatility on growth. Can you provide intuition for this result within Banerjee-Newman framework (assume that real exchange rate volatility is equivalent to the higher variance of returns on both small and large projects)?

Problem 3: Incentives to study for Kenyan girls

This problem examines the relationship between merit awards and academic performance, as measured by school exams, among Kenyan schoolgirls. In

early 2001, Grade 6 girls in a random subset of "treatment" schools (variable name "treat") were offered a large cash award if they scored in the top 15% of all treatment school girls. The attached generated dataset contains test score information from late 2000, the year before the program, and late 2002, one year after the program had ended. (The test score outcomes ("test00", "test02").) Attach the STATA code (or code from another statistical package that you will be using) as well as regression output. The goal of this problem set is to understand medium-term impact of the program.

1. Estimate ATE (Average Treatment Effect) consistently using bivariate relationship.

2. Compare standard errors if you do and do not take into account correlations of program responses within schools. Which empirical strategy is more reasonable? What does it imply about the resulting bivariate estimate of ATE?

3. Can one make estimation more precise? How? Do it. Interpret the results. State the size of the effect on average.

4. Is there a difference in returns for the program depending on the skill (which can be proxied by the initial test score). Estimate it.

5. Is anyone losing from the program? If yes, who exactly? By how much? Why this might be?

6. Is there a relationship between age and returns from the program?

Problem 4: School Inputs: The Case of Flip Charts in Kenya

(Please attach the code you have written to generate the results in whatever software you have used)

There are two related data sets for this problem: retro.dta and prosp.dta. These data come from Paul Gewwe, Michael Kremer et al. (2004), "Retrospective vs. Prospective Analyses of School Inputs: The Case of Flip Charts in Kenya," Journal of Development Economics, 74, 251-268. The data and the paper are downloadable from the course web page. The aim of this problem is to compare different methods of estimating the effect of wall charts on test scores.

The main variables measuring wall charts are: *wallchar* (in retro.dta) that measures the number of wall charts in the school, which the student attends and *wc* (in prosp.dta) which is a dummy indicating whether the school received wall charts from the Dutch NGO, and 0 otherwise.

Note that the NGO gave 4 wall charts to the recipient schools; thus, in the prospective data, $wc = 1$ represents a package of 4 wall charts. In order to make your results from the retrospective and prospective studies comparable, you would want the wall charts measure in the retrospective data set also to be in units of 4 wall charts. Thus, in the retrospective data, generate a new variable wc_r which is equal to wallchar divided by 4. Now, in the retrospective data, $wc\_r = 1$ also represents a set of 4 wall charts.

1. OLS

   In this part, examine the effect of wall charts on test scores using the retrospective data.

   (a) In an attempt to estimate the effect of wall charts on test scores, regress normalized test score on wc_r. Report and interpret the coefficient on wc_r.

   (b) Now regress the normalized test score on wc_r, controlling for whether the classroom is indoors, whether the roof leaks, blackboard condition, textbooks per pupil (use bkpup), desks per pupil, teacher training level, and class size (see variable labels in the dataset to determine the definitions of the variables). Why might you want to use each of these controls? How does the coefficient

on wc_r in this regression compare with the coefficient on wc_r in (i)? What do you conclude from this comparison?

(c) What could be problematic with using OLS regression like (i) or (ii) to estimate the effect of wall charts on test scores? Which way would you expect the coefficient on wc_r to be biased? Why?

2. Differences-in-differences

Continue using the retrospective data. Flip charts are subject-specific, and hence are relevant for some subjects but not for others. In particular, there are flip charts for teaching math, science, and home science (i.e., sub = "mat" or "sca" or "hsb"), but not for English, Swahili, geography, or arts (i.e., sub ="eng" or "kis" or "ghc" or "acm").

(a) Based on the above information, propose and calculate a DD estimator for the effect of wall charts that compares the impact of wall charts on test score of students in the three wall chart and the four non-wall-chart subjects. Interpret.

(b) Compare this with the OLS result. What is the difference? Why are they different?

(c) What might be some problems with the DD estimate of the effect of wall charts on test scores?

3. Randomized evaluation

For this part, use the prospective data set, prosp.dta. Note that in this data set, wc measures whether or not the student is in a school that received a package of four wall charts (including a wall map), so that wc is a dummy variable.

(a) Calculate the mean test score for tests taken by students in schools which received wall charts, and the mean test score for tests taken by students in schools which did not receive wall charts. Take the difference of these conditional means. How do you interpret the difference? Note that you can also calculate the difference of these conditional means by regressing test score on wc; do this, and verify that the coefficient on wc equals the difference of conditional means.

(b) Note that in this sample, geography (sub = "ghc") is a wall-chart-related subject since the wall chart packet includes a wall map. Calculate the difference in mean test score, for tests in wall-chart-related subjects, between students in schools that received wall charts and students in schools that did not. In trying to estimate the effect of wall charts on test scores, why might you prefer this to the calculation in part (i)? Interpret the result.

(c) Calculate the difference in mean test score, for tests in non-wall-chart-related subjects, between students in schools that received wall charts and students in schools that did not. Why would you want to do this?

4. Comparison

   What is the most preferable estimation method. Why?