Written Exam for the B.Sc. or M.Sc. in Economics summer 2017

Economics of Education

Final Exam

June 9, 2017

(3-hour closed book exam)

Please note that the language used in your exam paper must be English.

This exam question consists of 4 pages in total (3 plus this title page).

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This is the final exam for Economics of Education, Spring 2017. You have three hours to answer the following four questions. Draft your responses with an eye to clarity of exposition and structure as well as to showing your understanding of the concepts learned in class. Link the problem at hand to economic theory. You are free to make any reasonable assumptions that help you in answering, as long as you are specific and explicit.

Make sure to *pace yourself.* Also, you may choose to work on the questions in a *different order*: All questions can be answered independently.

Human Capital Policy in France

France is a country that ranks 19th in reading and 26th in Math on the PISA study of 2015, comparing performance of 15-year-olds in the OECD and partner countries, making it middle-of-the-pack.[1]

But France stands out when it comes to inequality of educational performance by parental background and immigrant status. Socio-economic status explains substantially more of the variation in PISA science test scores in France than in other countries. For example, the OECD reports that an increase of the socio-economic status by one standard deviation leads to a gain of 38 points in the OECD as a whole, but a full 57 points in France. This is the highest slope observed in the entire sample, and corresponds to more than a year of schooling. In France, the gap in science performance between students in the top and bottom quarters of socio-economic status is among the largest of countries participating in PISA. Immigrant students (first generation) score 87 points lower than non-immigrants in France, versus a 53-point-gap for the OECD average. The gap for second-generation immigrants is also substantially larger in France (50 vs 31 points).

The newly elected president Emmanuel Macron has made reducing inequality through educational investments one of his very specific campaign promises. Specifically, he suggests a drastic class-size reduction in certain disadvantaged schools. His program states

> *We will limit the class size to 12 students per teacher in grades CP and CE1 [ages 6 to 8] that are in* priority zones.

These *priority (education) zones* are particularly disadvantaged neighborhoods, selected roughly on economic and education criteria, such as parents' socioeconomic background, unemployment rate, fraction of students for whom French is a second language, fraction of students that had to repeat a grade, and parental education. Macron's program further states that

> *Teachers in these priority zones will receive a yearly net prime of 3000 euros. And they will be more experienced: By 2022, those teaching in priority zones will have at least 3 years of experience.*

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[1]Sources: OECD (2016), *PISA 2015 Results (Volume I) - Excellence and Equity in Education*, PISA, OECD Publishing Paris; and OECD (2016), *Education at a Glance 2016: OECD INDICATORS*, OECD Publishing, Paris.

Questions

1. Use the classical Ben Porath human capital model to analyze Macron's policy suggestion. You may use the the optimal schooling allocation equation copied below.

   (1) Where would the proposal enter in this model? (Which variable would you use?)

   (2) What are the effects of this policy, within this model?

   (3) Would it reduce inequality?

   (4) Would the effect be homogenous (i.e., equal for all students)?

   (5) Which assumptions in Ben-Porath lead us to some conclusions that we would challenge when thinking of this particular example? (You may contrast it to Becker-Tomes.)

   The optimal share of time in schooling in period t by individual i is S_{it}^*:

   $$S_{it}^* = \left[\frac{\beta_{t+1}}{\beta_t} \frac{\alpha}{1+\rho} \frac{1}{H_{it} + \gamma_t/\beta_t} \left(A_i H_{it} E_{it} \right)^\alpha \right]^{1/(1-\alpha)},$$

   where

   - β are the wage-returns to human capital,

   - H_{it} is i's human capital in period t,

   - A_i is personal initial learning ability,

   - E_{it} are public expenditures on schooling,

   - α is the parameter of the human capital production function, ρ is the discount rate, γ is the direct cost of schooling.

2. What does empirical evidence say about how effective we expect this class size reduction to be? Please describe also how the empirical evidence is established, and how that makes different types of studies more or less relevant to the case at hand.

3. What other policies could have been used to improve the educational outcomes of these children in disadvantaged geographic areas? Describe them briefly and note the evidence for their effectiveness.

4. If we take Macron's education policy suggestion as an early human capital investment, what are the likely effects on crime?

   (1) Briefly describe the prediction from an empirical standpoint.

   (2) *Extra credit:* Discuss the mechanisms through which the investment operates in Lochner's model that we studied. For reference, the optimality conditions from the first order conditions are given on the next page.

Optimality conditions in Lochner (2004):

Crime:
$$\frac{\partial N(k_t, H_t, \theta)}{\partial k_t} = w_t H_t + \frac{\partial P(k_t)}{\partial k_t} \left[F + \beta \left\{V_{t+1}\left(H_{t+1}\right) - \Omega_{t+1}\left(H_{t+1}\right)\right\}\right]$$

H Investment:
$$w_t H_t + \gamma = \beta \left[P(k_t)\Omega'_{t+1}(H_{t+1}) + (1 - P(k_t))V'_{t+1}(H_{t+1})\right] \cdot \frac{\partial f()}{\partial I_t}$$

where

- $N(k_t, H_t, \theta)$ is the benefit from engaging in crime for share k_t of the time,

- H_t is human capital at time t, and w_t its associated wage,

- $P(k_t)$ is the probability of incarceration, depending on crime time k_t, and F is the direct fine associated with incarceration.

- The value of all future periods is $\Omega_{t+1}\left(H_{t+1}\right)$ when incarcerated, and $V_{t+1}\left(H_{t+1}\right)$ when free.

- $f()$ is the production function of human capital, from $H_{t+1} = H_t + f(I_t, H_t, A)$.

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