Econ 435/835 Final Examination

Thursday, 16th April 2009, 1:00 - 3:30 p.m. Total points: 100

Be sure to explain/justify all your steps. You will be well-rewarded for completeness in answers, but not for making points way off the mark.

1. Let us consider the Galor and Zeira (1993) paper on income distribution and growth. In this paper, each individual lives for 2 periods. In the first period, he decides on acquiring education or not (if he does not go to school as a child, then he earns no income in the first period) and then in the second period he works. There are two types of jobs: skilled jobs (which can only be done by educated workers), which pay a wage $w_s = 150$ and unskilled jobs, which pay a wage $w_u = 50$.

Acquiring education is costly and requires spending an amount $h = 30$. There is a lending market, but the interest rates for borrowing and lending differ. People can lend money at the interest rate $r = 1.0$ and borrow money at the interest rate $i = 3.0$.

Each individual has once child and cares about his own consumption (priced at \$1 per unit) c and the bequest that he leaves for his child b, according to the following utility function: $u(c, b) = c^{\alpha} b^{1-\alpha}$, where $0 < \alpha < 1$.

(a) Suppose an individual receives a bequest x from his parents. For what values of x will this individual decide to acquire education?

(b) Determine the dynamics of the process i.e. if one receives bequest x_t from his parents, how much bequest, x_{t+1}, does he leave for his child?

(c) Determine the steady state(s) of this process? Which group of individuals converge to which steady state?

(d) Suppose the government intervenes to reduce distortions in the financial market so that the borrowing and lending interest rates are both now $i = r = 1.0$. What are the steady state(s) of this process? Which group of individuals converge to which steady state?

[**Part (e) is for MA students only.**]
(e) Reconsider the case where the borrowing interest rate is $i = 3.0$ and the lending interest rate is $r = 1.0$. Take a country where the initial distribution of wealth is given by the uniform distribution over the interval $[0, 200]$. What is the long run distribution of wealth and the long-run average wealth of this country?

2. Consider the Murphy, Shleifer and Vishny (1989) framework in which there are $k = 10$ goods. There are a total of 100 consumers in this economy each of whom supply 1 unit of labor inelastically and whose utility over the 10 goods is given by the following utility function:

$$u(x_1, x_2, ..., x_k) = \ln(x_1) + \ln(x_2) + ... + \ln(x_k)$$

Initially, all of the 10 sectors have a host of traditional firms that each convert 1 unit of labor into 1 unit of the final good. However, there are potential monopolists in each sector with modern technologies who are considering entry. To enter a particular sector requires a fixed up-front investment of $F = 5$ units of labor. Once that is incurred, the new technology is able to convert 1 unit of labor into $\alpha = 3$ units of the final good.

This is a closed economy with all the profits from the firms accruing to the consumers (who won shares of the firms). Take labor as the numeraire so that the wage is normalized to 1.

(a) Determine the equilibrium for this economy i.e. how many sectors modernize? Verify that there is a unique equilibrium in this case.

(b) Suppose working in the modern firms is hard so that workers who choose to work in such firms are required to be paid an extra amount v. Thus, if the wage in traditional firms is 1, that in the modern firms will be $1+v$. Can there be multiple equilibrium now? If so, give the set of parameters under which multiple equilibria exist in the model.

[**Part (c) is for MA students only.**]
(c) Reconsider the set up of part (a) where the wages of workers in traditional and modern firms are the same i.e. $wage = 1$ in both types of firm. But the fixed up-front investment costs depend on how many other firms choose to modernize (e.g. machinery becomes cheaper to buy if there are more firms demanding it). Specifically, if n firms modernize, then the fixed up-front investment required is $F = 5/n$ units of labor per modern firm. Are there be multiple equilibrium now?

3. (a) To study the impact of institutions on income, some authors have run the following OLS regression:

$$\log(\text{GDP per capita}) = 0.24 + 0.52 * (\text{Quality of Institutions})$$

where the standard error on the coefficient on the quality of institutions is 0.06. Can the results of this regression be used to argue that institutional quality has a significant impact on economic performance? Be sure to explain in detail what are the problems with such an interpretation.

(b) Acemoglu, Johnson and Robinson (2001) use an instrumental variable approach to address some of the problems with the regression in (a). How does the use of an instrumental variable help solve the problem? What is the instrument that Acemoglu, Johnson and Robinson use? Explain intuitively why it may be a valid instrument for addressing the issue at hand?

(c) What do Acemoglu, Johnson and Robinson find? You may use table 4 of results from their paper (attached below) to guide your discussion. Provide as much interpretation as you can, but do so with justification. Do not make points way off the mark.

(d) Are there any reasons to question the validity of Acemoglu, Johnson and Robinson's instrument? What do they do to address such questions?

4. (a) How does Amartya Sen impute the number of "missing women" in India and China in his famous 1990 article "More than 100 million women are missing."

(b) What strategy does Nancy Qian use in her 2008 article "Missing Women and the Price of Tea in China," to study the impact of economic conditions on sex ratios? Apart from giving details of her strategy, be sure to provide justification for why the strategy is a valid one.

(c) What does Qian find for the effect of economic conditions on the sex-ratio? You can use table 3 from her paper (attached below) to guide your discussion.

(d) What does Qian find for the effect of economic conditions on relative educational attainment? You can use table 4 from her paper (attached below) to guide your discussion.

(e) Some have argued that the availability of technology that enables pre-natal sex-selection has an important effect on the sex-ratio. This technology was becoming available in China in the 1980s, which was also the period that Qian looked at. Does the availability of this technology affect Qian's estimates? Why or why not?

Acemoglu, Johnson and Robinson (2001)

TABLE 4—IV REGRESSIONS OF LOG GDP PER CAPITA

	Base sample (1)	Base sample (2)	Base sample without Neo-Europes (3)	Base sample without Neo-Europes (4)	Base sample without Africa (5)	Base sample without Africa (6)	Base sample with continent dummies (7)	Base sample with continent dummies (8)	Base sample, dependent variable is log output per worker (9)
Panel A: Two-Stage Least Squares									
Average protection against expropriation risk 1985–1995	0.94	1.00	1.28	1.21	0.58	0.58	0.98	1.10	0.98
	(0.16)	(0.22)	(0.36)	(0.35)	(0.10)	(0.12)	(0.30)	(0.46)	(0.17)
Latitude		−0.65		0.94		0.04		−1.20	
		(1.34)		(1.46)		(0.84)		(1.8)	
Asia dummy							−0.92	−1.10	
							(0.40)	(0.52)	
Africa dummy							−0.46	−0.44	
							(0.36)	(0.42)	
"Other" continent dummy							−0.94	−0.99	
							(0.85)	(1.0)	
Panel B: First Stage for Average Protection Against Expropriation Risk in 1985–1995									
Log European settler mortality	−0.61	−0.51	−0.39	−0.39	−1.20	−1.10	−0.43	−0.34	−0.63
	(0.13)	(0.14)	(0.13)	(0.14)	(0.22)	(0.24)	(0.17)	(0.18)	(0.13)
Latitude		2.00		−0.11		0.99		2.00	
		(1.34)		(1.50)		(1.43)		(1.40)	
Asia dummy							0.33	0.47	
							(0.49)	(0.50)	
Africa dummy							−0.27	−0.26	
							(0.41)	(0.41)	
"Other" continent dummy							1.24	1.1	
							(0.84)	(0.84)	
R^2	0.27	0.30	0.13	0.13	0.47	0.47	0.30	0.33	0.28
Panel C: Ordinary Least Squares									
Average protection against expropriation risk 1985–1995	0.52	0.47	0.49	0.47	0.48	0.47	0.42	0.40	0.46
	(0.06)	(0.06)	(0.08)	(0.07)	(0.07)	(0.07)	(0.06)	(0.06)	(0.06)
Number of observations	64	64	60	60	37	37	64	64	61

Notes: The dependent variable in columns (1)–(8) is log GDP per capita in 1995, PPP basis. The dependent variable in column (9) is log output per worker, from Hall and Jones (1999). "Average protection against expropriation risk 1985–1995" is measured on a scale from 0 to 10, where a higher score means more protection against risk of expropriation of investment by the government, from Political Risk Services. Panel A reports the two-stage least-squares estimates, instrumenting for protection against expropriation risk using log settler mortality; Panel B reports the corresponding first stage. Panel C reports the coefficient from an OLS regression of the dependent variable against average protection against expropriation risk. Standard errors are in parentheses. In regressions with continent dummies, the dummy for America is omitted. See Appendix Table A1 for more detailed variable descriptions and sources.

Qian (2008)

Table III – OLS and 2SLS Estimates of The Effect of Planting Tea and Orchards on Sex Ratios Controlling for County Level Linear Cohort Trends

Coefficients of the Interactions between Dummies Indicating Whether a Cohort was Born Post Reform and the Amount of Tea Planted in the County of Birth

	Dependent Variables					
	Fraction of Males			Tea*Post	Fraction of Males	
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	1st	IV	IV
Tea * Post	-0.012	-0.013	-0.012		-0.072	-0.011
	(0.007)	(0.006)	(0.005)		(0.031)	(0.007)
Orchard * Post	0.005					
	(0.002)					
Slope * Post	-0.002			0.26		
	(0.002)			(0.057)		
Linear Trend	No	No	Yes	Yes	No	Yes
Observations	28349	37756	37756	37756	37756	37756

All regression include county and birth year fixed effects and controls for Han, and cashcrop*post.
All standard errors are clustered at the county level.
In column (1), the sample includes all individuals born during 1970-1986.
In columns (2)-(6), the sample includes all individuals born during 1962-1990.
Post=1 if birthyear>1979.
Data for land area sown are from the 1997 China Agricultural Census.

Table IV – The Effect of Planting Tea, Orchards and Category 2 Cash Crops on Education Attainment
Coefficients of the Interactions between Dummies Indicating Whether a Cohort was Born Post Reform and the Amount of Tea, Orchard or Cash Crops Planted in the County of Birth

	Dependent Variable: Years of Education							
	A. Dummy Variable for Crops Sown				B. Continuous Variable for Amount of Crops Sown			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All	Female	Male	Diff	All	Female	Male	Diff
Tea * Post	0.199	0.247	0.149	-0.069	0.449	0.383	0.501	-0.097
	(0.043)	(0.057)	(0.049)	(0.063)	(0.107)	(0.133)	(0.146)	(0.218)
Orchard * Post	-0.124	-0.226	-0.029	0.174	-0.021	-0.119	0.054	0.118
	(0.037)	(0.050)	(0.040)	(0.056)	(0.056)	(0.071)	(0.064)	(0.086)
Cat2 * Post	-0.036	-0.024	-0.037	-0.020	-0.065	-0.040	-0.074	-0.012
	(0.026)	(0.032)	(0.028)	(0.040)	(0.032)	(0.041)	(0.035)	(0.050)
Observations	68522	33538	34984	58314	68522	33538	34984	58314
R-squared	0.37	0.48	0.34	0.14	0.37	0.48	0.34	0.14

All regressions include controls for Han, county fixed effects and birth year fixed effects.

All standard errors clustered at the county level.

Post = 1 for cohorts born after 1976.