

Los Andes Exam 2009: Answers

Each question was graded on a 0-5 scale with the following They are weighted equally. The answers should be emailed to Blanca (or hard copy handed in) on Tuesday July 7 by 5pm.

1 Question 1.

During the discussion of the democratization model in class the question came up about how the nature of equilibria changed when the elite had to set the tax rate before they knew whether the revolutionary threat was high or low. I briefly discussed this and argued that qualitatively similar results held. Let me remind you of my argument. Assume we are in the part of the parameter space where the revolution constraint binds. When the elite plays before the citizens they can either set a tax rate of zero in which case if the revolution threat is high they will be expropriated. If not they will receive their income. The value of this strategy is

$$V^r(\tau^N = 0) = (1 - q)(y^r + \beta V^r(\tau^N = 0)) + q \cdot 0$$

or

$$V^r(\tau^N = 0) = \frac{(1 - q)y^r}{1 - (1 - q)\beta}$$

Alternatively the elite can set a tax rate which is just high enough that even if the threat state is high they citizens will not want to undertake a revolution. Call this tax rate $\bar{\tau}$. In this case they have to set $\bar{\tau}$ every period so their payoff is

$$V^r(\tau^N = \bar{\tau}) = \frac{(1 - \bar{\tau})y^r + (\bar{\tau} - C(\bar{\tau}))\bar{y}}{1 - \beta}$$

Now the elite will prefer to set $\bar{\tau}$ if $V^r(\tau^N = \bar{\tau}) \geq V^r(\tau^N = 0)$.

1. I argued loosely in the class that the analysis of this model generated results which were quite similar to the one I presented in class. Now the elite can always stop a revolution if they want, but in some circumstances they do not want to. Using the above formulas discuss the circumstances under which the elite would be willing to risk revolution.

Now I want you to extend the analysis to incorporate democratization and repression. Take the model I used in class and now before the revolution state is revealed assume that in addition to redistribution the elite can either repress or democratize.

2. Would the elite ever wish to democratize in this model?

3. Under what circumstances would the elite find it desirable to repress?

(Hint: if you cannot handle the mathematics then just try to make an intuitive argument. If you can handle the mathematics then please try to write it down).

Answer: The elite will be indifferent between redistributing at a rate $\bar{\tau}$ and setting a zero tax but risking revolution if the following holds:

$$\frac{(1 - \bar{\tau})y^r + (\bar{\tau} - C(\bar{\tau}))\bar{y}}{1 - \beta} = \frac{(1 - q)y^r}{1 - (1 - q)\beta} \quad (1)$$

Note that $\bar{\tau}$ is the tax rate which makes the citizens just indifferent between having a revolution and accepting redistribution at this rate. Therefore it is implicitly defined by the equation

$$\frac{(1 - \bar{\tau})y^p + (\bar{\tau} - C(\bar{\tau}))\bar{y}}{1 - \beta} = \frac{(1 - \mu)\bar{y}}{(1 - \beta)(1 - \delta)}$$

Do some cancelling and substitute for the definition of y^p and this reduces to

$$(1 - \bar{\tau})(1 - \theta) + (\bar{\tau} - C(\bar{\tau}))(1 - \delta) = (1 - \mu) \quad (2)$$

which defines $\bar{\tau}$ as a function of θ and μ . Note it is independent of q . For this first part of the question I wanted a discussion of the comparative statics of condition (1). A first obvious result is that the higher is q the lower is the right side of (1) and the more likely it is that the elite will decide to engage in redistribution (rather than risk revolution). Another obvious result is with respect to μ . An increase in μ makes revolution more costly and reduces $\bar{\tau}$ the tax the elite have to set to stop revolution. This makes redistribution more attractive (increases the left side of (1)). Finally, what about inequality? Let's first differentiate (2) to see what happens to $\bar{\tau}$ when inequality changes

$$\frac{d\bar{\tau}}{d\theta} = \frac{1 - \bar{\tau}}{(1 - C'(\bar{\tau}))(1 - \delta) - (1 - \theta)}$$

Now the numerator is positive. To see what the sign of the denominator is recall that the first-order condition which defined the optimal tax for the poor τ^p was

$$1 - \theta = (1 - C'(\tau^p))(1 - \delta)$$

now $\bar{\tau} \leq \tau^p$ so that $(1 - C'(\bar{\tau}))(1 - \delta) - (1 - \theta) \geq 0$. This is obvious since $1 - \theta$ is the marginal cost from increasing the tax rate to the citizens. Since this is equal to the marginal benefit at τ^p it must be less than the marginal benefit for some lower level of taxation. This implies that

$$\frac{d\bar{\tau}}{d\theta} \geq 0$$

When inequality goes up the level of the tax rate that the elite have to set to stop a revolution goes up. This makes sense.

Now re-write (1) and substitute for the definition of the income of the rich,

$$\frac{(1 - \bar{\tau}) + (\bar{\tau} - C(\bar{\tau}))\frac{\delta}{\theta}}{1 - \beta} = \frac{(1 - q)}{1 - (1 - q)\beta}$$

Obviously the right side of this is independent of inequality. The question is whether the left side goes up or down. We already figured out that higher inequality increases the tax the elite have to set. The only other term is the ratio $\frac{\delta}{\theta}$. Higher inequality reduces this ratio. Hence an increase in inequality reduces the left side, which is the utility of the elite from redistribution, hence it makes it less attractive to redistribute as opposed to risking revolution.

2. Would the elite ever want to democratize? The answer is no. There are two cases, either the elite favor redistribution or they favor risking revolution. If they favor redistribution then they have to pay a tax $\bar{\tau} \leq \tau^p$ which is always at least as good and may be strictly less than democracy. Hence democracy must be worse (the elite are indifferent if $\bar{\tau} = \tau^p$). If the elite prefer risking revolution then we know that this is better for them than paying $\bar{\tau}$ in which case it must be better for them than paying the tax rate of democracy which is the same or worse than $\bar{\tau}$. Thus the elite never choose democracy in this model. This is not surprising. Democracy arose as a way of solving the commitment problem but the change in the timing of the game removed the commitment problem, hence no democracy.

3. Now repression. I will not write down the math but it is simple. The payoff to the elite from repression is exactly the same as in Chapter 5 of our book which I explained in class:

$$V^r(O, \mu^H | \kappa) = \frac{y^r - (1 - \beta(1 - q))\kappa y^r}{1 - \beta}$$

Repression could be cheaper than paying $\bar{\tau}$ if $V^r(O, \mu^H | \kappa) \geq V^r(\tau^N = \bar{\tau})$ it could also be that if the elite favor repression so that $V^r(\tau^N = 0) \geq V^r(\tau^N = \bar{\tau})$ we can still have $V^r(O, \mu^H | \kappa) \geq V^r(\tau^N = 0)$. Thus just as in the book there will be two critical values for repression, call them κ^* and κ^{**} which satisfy

$$V^r(O, \mu^H | \kappa^*) = V^r(\tau^N = \bar{\tau})$$

and

$$V^r(O, \mu^H | \kappa^{**}) = V^r(\tau^N = 0)$$

and the results here will be very similar. If the cost of repression is less than these critical values then the elite will favor repression over redistribution of risking a revolution, respectively.

2 Question 2.

Read the paper “Do Institutions Cause Growth” by Ed Glaeser, Rafael La Porta, Florencio Lopez-de-Silanes and Andrei Shleifer (2004) Journal of Economic Growth, September (you can download this from Shleifer’s Harvard web page). They make a number of arguments in that paper. One that human capital is a more important source of growth than institutions. Another is that commonly used measures of the security of property rights do not properly measure institutions. I want you to discuss these issues. First, is the

institutional approach something which is competing with the human capital approach? Second, are they correct that commonly used measures of property rights, for example, do not actually measure institutions?

Answer: I was not expecting a long essay here. There first main point is that human capital is not competing with institutions. It is obvious (and I stressed this in lectures 1 and 2) that economic growth is caused by physical and human capital accumulation, technical change etc. The institutional approach says that these are a result of incentives. People invest in human capital because of incentives and it is institutions that create these incentives (political institutions induce politician to invest in education, economic institutions induce people to invest in human capital). So human capital must be an important channel via which institutions influence economic growth. In the language of the institutions approach human capital is a proximate cause of growth.

Could it be the other way round? It is possible that human capital accumulation causes institutions (though the evidence is actually not consistent with this, at least for democracy - though I did not talk about this in the lectures see Acemoglu, Johnson, Robinson, Yared (2005) "From Education to Democracy?" *American Economic Review* 95, no. 2: 44-49.). Moreover, in my flow diagram I emphasized the idea that institutions influence incentives and resource allocation but these in turn feed back into institutions, so there is mutual causality at some level. This being the case you could argue that it is arbitrary to emphasize one part of the causal chain rather than another. This may be partially correct, but it seems to me to be much clearer to think of the institutions as the rules of society and the rules having consequences, as in a game. I tried to make this point in the context of the Americas where I showed the historical data does not show that human capital was higher for people who went to North America. Actually, the Spanish had more human capital. Of course subsequently human capital diverged but this was a result of the different institutions set up. At least in this case it makes more sense to start with institutions and not human capital, unless you want to argue that the high human capital of the Spanish led to bad institutions, which of course is not what Glaeser et al want to argue.

With respect to the measure of property rights, Glaeser et al. criticize this as being an outcome. Yes of course it is otherwise we would never have had to instrument it. The whole point of colonial origins is to think of the protection of property rights as an outcome and find a way of thinking about why it varies so much in equilibrium. They argue that institutions are only things such as laws, de jure or formal institutions. I argued against this view in the class and I argued that variation just in these institutions will not explain what we are interested in. We care about whether or not laws are enforced and probably there are also important informal or de facto rules as well. The security of property rights is an equilibrium phenomenon. They want to say that this is not an institution, but I think this is just confusion. I said institutions are the rules which influence incentives and it is obvious that the security of property rights influences incentives. Maybe this is not exactly a rule, but it is an important consequence of the rules (formal and informal, de jure and de facto) and this is why people call this an institution. It could be that this terminology is not

optimal, but it does make sense.

3 Question 3.

Read the article by Nathan Nunn “The Long-Term Effects of Africa’s Slave Trades” Quarterly Journal of Economics, which can download from his Harvard web page. Explain the identification strategy of this paper and what key assumption is required for the causal effect of slavery on income per-capita to be identified.

Answer: This question should have been the simplest. The most difficult part (apart from constructing the data) of trying to estimate the effect of the slave trade on long-run growth in African countries is the fact that the intensity of the slave trade is endogenous. Slaving did not happen randomly more in some areas than others. It could be that slaving occurred more in places which were intrinsically poor so that their societies were less developed which made it easier to grab slaves. Thus there could be selection of slaving into initially poor areas naturally generating a negative correlation between the intensity of the slave trade and income per-capita today. Nunn takes two strategies to look at this. First you can try to directly check by looking at historical data on population density (positively correlated with incomes in the pre-modern world) if places where there was more slaving were poorer. The evidence suggests that if anything slaving took place more in higher density places (i.e. in relatively richer places). So this reduces a major concern. Second, and even better, Nunn proposes a real identification strategy. The idea is to find some source of variation in slaving which is not itself a determinant of income per-capita today. His idea is distance to historical slave markets. The further from such a market, other things equal, the greater the cost of moving slaves and the less slaves there should have been. The crucial identification assumption is that distance to historical slave markets is not itself a determinant of income per-capita today. This seems likely. Of course distance to markets may influence transportation costs and trade, but African countries do not export to former slave markets, they export elsewhere so Europe etc. The distance between African countries and historical slave markets is not very correlated with distance to current export markets.