

Name and Student ID: _____

Due 18 Nov 2014. You can turn in these pages or another printed version.

1. (5 points) The 2006 Stern Review on the Economics of Climate Change used a discount rate of 1.4%. Calculate the net present value of a \$10 investment that returns \$1 per year in years 2-15 (14 payments representing “lower harm from CC”) with a discount of 1.4% versus 4.0%. I recommend that you use Excel to calculate, with this formula:

$$NPV = \sum_{t=0}^{t=15} \frac{FV}{(1 + \delta)^t}$$

Note that the NPV of the initial \$10 investment should be \$10.

Given your answers and the “payoff” under each scenario, give two reasons why someone might choose one discount rate (and its result) or the other (i.e., argue both sides). Discuss why some countries may use the lower rate while others would use the higher rate, from a common pool resource perspective.

Solution: I got answers of \$2.63 for 1.4% and \$0.56 for 4%.

The positive net payoff with 1.4% implies that it’s worth investing in mitigating climate change. This rate makes sense if you worry about the potential for large and disruptive harm from CC. It also puts more weight on the welfare of future generations who will not appreciate a damaged inheritance. The lower payoff given the 4% rate means the mitigation investment is not as good. Arguments in favor of this rate include the ability of people in the future to save themselves with better technology and uncertainty over whether CC will have predicted negative impacts (i.e., best not to worry “too much” about the future).

Countries will choose different rates based on priorities. Poorer countries tend to have a bias towards present consumption due to hunger or lower life expectancy, caring less about their impact on others. Countries that are less egalitarian and more opportunistic (risk-seeking) also have lower rates (e.g., 4%), as “the children of the future” are not so important compared to enjoying adventures now. Countries are more likely to use the higher rate if they care about others, their “future selves” (children), or the environment *per se*.

2. (5 points) China’s One Child Policy (https://en.wikipedia.org/wiki/One-child_policy) has been credited with “reducing births” by between 100 to 400 million babies. Critics of this policy note that other countries (e.g., Thailand) have seen similar decreases in births/woman without such a draconian policies (forced abortions, civil penalties, etc.) due to the increasing “opportunity cost of children” to women.
- (a) (2 points) Describe two ways in which the opportunity cost of children to parents (and mothers in particular) rises as a country develops.

Solution: First, the cost of children (school, goods, etc.) rises as parents develop their “human capital.” Poor parents feed their kids but they do not usually pay for school, or even clothes. Second, women in richer countries have better options than raising children (in terms of their education, work and wages), which increases the cost of their time devoted to children.

- (b) (3 points) Draw a demand curve that represents the aggregate demand for children from couples, based on the “value” of children and supply curve based on their “cost” to the individual. Now draw another supply curve representing the “social cost” of children in terms of fewer resources for others, environmental strain, etc. These two supply curves will result in two different quantities of children in equilibrium.

Now explain how – *and* indicate where – a parent’s decision to have a child may be sub-optimal from a social perspective using these curves.

Finally, compare a “market” allocation of children to the Chinese “bureaucratic” allocation of children via the one-child policy, in terms of efficiency. (Hint: compare one couple’s decision to have their first child with another couple’s inability (due to prohibition) to have a second child.)

Solution: The dotted supply curve shows a social quantity (Q_s) that’s lower than the private quantity (Q_p), due to its inclusion of the negative externalities of kids. A parent’s decision to have a child (green dot) may be sub-optimal because they do not consider social costs. In a “market” allocation of children, all three dots would be realized, but a “tax” on the negative externalities of kids would mean no kid born at the green dot. China’s one child policy attempts to capture the social cost of children without using prices. Under this policy, a family that could afford to cover all costs (red dots) would be prevented from having two kids while a family that could not cover the costs (green dot) would still have a child. This is inefficient.

