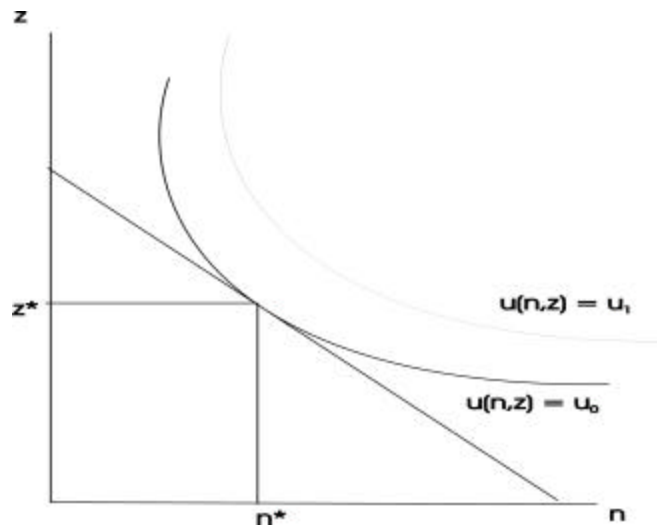


Answer Key to Homework # 2

1. Consider the utility maximization model of household fertility choice that we considered in the class. Suppose the utility function $u(n, z)$ of a household over the aggregate marketed good z and the desired number of surviving children n is given by $u(n, z)$. Suppose the price of the aggregate marketed good is $p_z = 1$ and the cost of a surviving child is p_n . Suppose the household has income I . Show graphically the budget set, indifference curve, and optimal choice of fertility level. Notice that for any factor that will affect fertility choice of the individual has to come through its effect on the child-cost p_n relative to the aggregate consumption good, or through its effect on household income I . Explain how the demand for children will be affected in each of the following cases, explicitly stating if the effect is through child cost, p_n , through household income I , or both.
- When mother gets higher education and thus have better chance of working and earning higher wages.
 - When government introduces mandatory schooling for all children.
 - When government prohibits employment of child labor.
 - Government spends more money on health so that infant mortality rate goes down. (Here distinguish between the actual number of children the parents will have to meet a desired number of children).
 - Government introduces social security program for all.



The components of child cost includes:

- 1) mother's time (child care costs, foregone income etc.)
- 2) cost of pre-school, school - both direct and opportunity costs (child labor)
- 3) cost of health care (preventing infant mortality, morbidity)
- 4) cost of goods (food, diapers etc.) required in raising a child.

- 5) future transfers from children to parents (old age security etc.)
- a) If mother's earnings go up, the opportunity cost (foregone wages) of raising a child increases. Since P_n increases, the household substitutes away from children. However, the increased earnings also causes an income effect because when the household income rises, the demand for children should increase if children are a normal good. The net effect depends on whether the substitution effect dominates the income effect, or vice versa. In the real world, we see that the substitution effect appears to dominate because mother's with higher wages tend to have fewer kids.
 - b) If the government introduces mandatory schooling for children, the child cost increases because the option to keep the kid at home or send the kid to work is no longer available. This reduces the demand for children.
 - c) If the government bans child labor, the child cost would increase just like in (b) because the option of sending kids to work (and thus lowering the child cost) is not available. This reduces the demand for children.
 - d) If the infant mortality rate goes down, the child cost would decrease because parents have to spend less to have the desired number of children. This would increase the demand for children. But there is another effect of infant mortality: when infant mortality is lower, the actual number of children that parents need to have in order to have the same desired number of children decreases (e.g. if there is no infant mortality, you have 1 child if you want 1 child, if it is 50%, you need to have 2 kids if you want 1 to live). This latter effect increases the demand for children. In the real world, we see that this effect dominates the cost effect.
 - e) If the government introduces a social security program for all, the lifetime cost (in terms of permanent income) of raising a child increases because the parents don't need to rely on transfers from their children in old age. Therefore, the investment motive for having kids falls, and the child cost rises. This reduces the demand for children.

From parts (a)-(e), we have a coherent story of why fertility rates are high in developing countries. These countries are characterized by low wages and employment options for women, weak laws on compulsory schooling and child labor, large agricultural sectors, high infant mortality rates and weak or absent social security.

2. Recall what we mean by private/individual benefits and social benefits of education. The benefits that directly accrue to one who is engaged in acquiring education is his/her *private or individual benefits*. But if others also benefit from some one else's education, then such benefits are social or *public benefits of education*. The other beneficiaries could be members of the immediate family, could be the community or neighbors, or could be the whole society, or even the whole world.

(a) What are the private or individual benefits of education? Explain each type of private benefits with suitable examples.

- Private benefit

- 1) Learning for enjoyment, for the sake of acquiring knowledge and deriving happiness, may not give you extra money. e.g. Studying art, piano, photography, learning about space, genetic research as part of general curiosity.
- 2) Financial rewards – Higher and better quality education provides higher earnings for an individual in the labor market.
- 3) More education leads to better decision one can make about one's life.
- 4) Higher education can lead to better chance for promotion.
- 5) Higher education leads to better chance to find a job in case of lay-off and lower chance of being laid-off.
- 6) Opportunities to network and to have mentors at college.

(b) What are the public or social benefits of education? Explain each type of social benefits that may accrue to the family members, community, or the whole society, with suitable examples.

- Public Benefits
 - At the family level: From your education, other family members such as your child (in future) & currently other siblings can get motivated for education.
 - Higher education of the mother leads to:
 - Lower fertility level
 - Higher education of the children
 - Better Health
 - Social Status of the whole family can go up.
 - Your education will make you independent and thus you will not be a burden to the parents.
 - Can provide parents better old-age support.
- Community Level – people in your neighborhood can benefit from your knowledge especially if the neighborhood is a little village
- Economy and World Level:
 - Education – higher earnings => higher tax revenues from which whole economy can benefit.
 - Improve civility, law & order.
 - With your education, you may discover some new medicine and new technology from which the whole society can benefit.

(c) Suppose social benefits exceed the private benefits. That may lead to a case for government subsidy for education. Can you explain why?

Example: People paying taxes to educate the younger generation will benefit everyo