

Econ 172: Issues in African Economic Development
Problem Set 2 (Due in class Tuesday March 7, 2006)

1. HIV/AIDS and Public Policy in Africa [4 points]

In **at most two pages** (double spaced), discuss **three** public health policy options for addressing the HIV/AIDS epidemic. For each policy option, clearly state the problem and how the policy would address the problem. The problems and corresponding policy options should be taken from lecture and the readings. If you were an African policymaker, which of these three would you focus your limited resources on, and why?

2. An Economic Model of the HIV/AIDS Epidemic [6 points]

Consider the following model of the spread of HIV/AIDS. Individuals live for two periods, which we will call “youth” ($t=1$) and “old age” ($t=2$). There is a value $V > 0$ to life (in either period) but utility is zero in that period if an individual is not alive.

In $t=1$, individuals must choose whether to have safe sex or unsafe sex, where engaging in safe sex imposes a cost C on individuals. (The simplest interpretation of C is the cost of purchasing a condom.) This is the key decision in the model. We assume unsafe sex always leads to infection with HIV.

Individuals may enter period $t=1$ already HIV⁺. Specifically, the individual believes s/he is HIV⁺ with probability $0 < R < 1$.

Not all individuals live to old age. For HIV⁻ individuals, the probability of living to old age is P , where $0 < P < 1$. For HIV⁺ individuals, the probability is $0 < P^{HIV} < P$.

Individuals believe there is some chance T , where $0 < T < 1$, that there will be free anti-retroviral (ARV) treatment by the time they reach old age, while with probability $(1 - T)$ there will be no ARVs. Assume that ARVs are completely effective at fighting HIV.

Lifetime utility is the sum of utility in $t=1$ and $t=2$. Individuals maximize *expected utility*. (In other words, if individual utility in a given period is u_0 with probability p , and u_1 with probability $(1 - p)$, then expected utility in that period is $pu_0 + (1 - p)u_1$.)

- a) Write out the equations representing expected individual utility of engaging in safe sex, $U(\text{Safe})$, and the expected utility of engaging in unsafe sex, $U(\text{Unsafe})$. **(1 point)**
- b) In what circumstances will individuals choose to have unsafe sex? Express this condition as an inequality involving V , C , P , P^{HIV} , T , and R . **(1 point)**
- c) Interpret the condition in b). In particular, how does individual sexual behavior change when: V increases; C decreases; P decreases; P^{HIV} increases; T increases; R increases. What do each of these parameter changes correspond to in reality? **(2 points)**
- d) In one page (double-spaced), discuss whether you find this to be a plausible model for the spread of AIDS in Africa. What important insights does this model provide (if any)? What important behavioral (i.e., psychological, social, economic) factors do you feel this model does not adequately address and why? **(2 points)**