

Econ 172: Issues in African Economic Development
Problem Set 2 (Due in class Thursday March 1, 2007)
[Please hand in your own solutions – do not solve in teams]

1. Geography and African economic development [3 points]

In roughly 1.5 to 2 pages, double spaced, discuss **three** specific geographic factors that may be negatively affecting African economic development. For each factor, clearly state the potential problem. In your view, which of these three factors has had the greatest negative impact on African economic development, and why?

2. An Economic Model of the HIV/AIDS Epidemic [7 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. [This is different than lecture.] The simplest interpretation of C is the cost of purchasing a condom. This is the key decision in the model.

We assume unsafe sex only sometimes leads to infection with HIV. People who engage in unsafe sex have infection risk T , where $0 < T < 1$. With probability $(1 - T)$ they remain HIV-

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 $0 < P^{HIV} < P$.

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, $U(\text{Unsafe})$. **(2 points)**

b) In what circumstances will each individual choose to have unsafe sex? Express this condition as an inequality involving V , C , P , P^{HIV} , and T . **(1 point)**

c) Interpret the condition in b). In particular, how does individual sexual behavior change when: C decreases; P decreases; P^{HIV} increases; T increases. What do each of these parameter changes correspond to in reality? **(1 point)**

d) Consider the case of Kenya before and after the 2003 DHS survey results came out, showing that HIV prevalence was actually far lower than people had previously believed. Which precise parameter in the model is affected by this change, and how will this reduction in perceived prevalence increase or reduce the extent of unsafe sex in the model? **(1 point)**

e) In roughly one page, double-spaced, discuss whether you find this to be a plausible model for the spread of AIDS in Africa. What is one important insight the model provides (if any)? What is one important behavioral (i.e., psychological, social, economic) factor you feel this model does not adequately address and why? **(2 points)**