Economics 172

Issues in African Economic Development

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Lecture 12 – February 22, 2007

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Why does HIV spread? A simple model

- Timing: two periods, Youth (t=1), Old age (t=2)
- Key decision in Youth: Engage in unsafe sex or not

- Likelihood of living to Old age:
  - $P \in (0,1)$ if HIV-
  - $P^{HIV} \in (0,P)$ if HIV+, so $P^{HIV} < P$

- Value of one period of life: $V > 0$
- Value of unsafe sex: $S > 0$

- Assume the agent is HIV- in her/his youth

Why does HIV spread? A simple model

- "Rational" decision rule: engage in unsafe sex if the "expected utility" of unsafe is greater than of safe sex

$EU \ (Safe \ sex) \quad = V + \{PV + (1 - P)*0\} = V(1+P)$

- Assume unsafe sex always leads people to be HIV+

$EU \ (Unsafe \ sex) = \{V+S\} + \{P^{HIV}V + (1 - P^{HIV})*0\}$
$\qquad\qquad\qquad = V(1+P^{HIV}) + S$

- $EU \ (Unsafe \ sex) - EU \ (Safe \ sex) = \boxed{S} + \boxed{V(P^{HIV} - P)} > 0$

Benefits (+) Costs (-)

Why does HIV spread? An extension

- Imagine people do not know their infection status. S/he thinks she has likelihood $R \in [0,1]$ of already being HIV+

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$\qquad = S + V(P^{HIV} - P)\boxed{(1-R)} > 0$

- "Nothing to lose": cost of unsafe sex smaller than before

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- What are implications of this model for public health messages that stress how widespread the HIV virus already is?

- What are the implications of this model for efforts to boost ARV treatment (e.g., Botswana)?

→ In both cases, the model predicts that unsafe sex could <u>increase</u> due to these health policy changes

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- For example, let *S = S(1 – R)*

  EU (Unsafe sex) – EU (Safe sex)

  $= S(1 – R) + V(P^{HIV} – P)(1 – R)$

  $= (1 – R)(S + V(P^{HIV} – P)) > 0$

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- For example, let $S = S(1 - R)$

  $EU \, (Unsafe \, sex) - EU \, (Safe \, sex)$

  $= S(1 - R) + V(P^{HIV} - P)(1 - R)$

  $= (1 - R)(S + V(P^{HIV} - P)) > 0$

→ In this case the "nothing to lose" effect and the "altruism effect" exactly cancel out

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(4) Pockets of poor information about HIV/AIDS

(5) Others?

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– In the model, testing would change R to zero (if the person is HIV-) or to one (if HIV+). So it could theoretically either increase or decrease unsafe sex, depending on what people's expectations are about their infection status

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(6) Development of an HIV vaccine

- For next time: finish the HIV/AIDS section

Whiteboard #1

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Whiteboard #2

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Whiteboard #3

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Whiteboard #4

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Whiteboard #5

Map of Africa

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