Economics 172
Issues in African Economic Development

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Table 2 Adjusted differences between cases and comparison pluckers on days plucking at 6-month intervals prior to AIDS-related termination*

<table>
<thead>
<tr>
<th>Years before termination</th>
<th>Difference†</th>
<th>Percentage difference‡</th>
<th>SE</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0 years</td>
<td>−1.689</td>
<td>−4%</td>
<td>2.732</td>
<td>0.536</td>
</tr>
<tr>
<td>2.5 years</td>
<td>0.466</td>
<td>1%</td>
<td>2.224</td>
<td>0.834</td>
</tr>
<tr>
<td>2.0 years</td>
<td>2.400</td>
<td>6%</td>
<td>1.956</td>
<td>0.220</td>
</tr>
<tr>
<td>1.5 years</td>
<td>4.113</td>
<td>10%</td>
<td>1.871</td>
<td>0.028</td>
</tr>
<tr>
<td>1.0 years</td>
<td>5.605</td>
<td>13%</td>
<td>1.940</td>
<td>0.004</td>
</tr>
<tr>
<td>0.5 years</td>
<td>6.876</td>
<td>16%</td>
<td>2.191</td>
<td>0.002</td>
</tr>
<tr>
<td>Near termination</td>
<td>7.927</td>
<td>19%</td>
<td>2.684</td>
<td>0.003</td>
</tr>
</tbody>
</table>

* The final regression model included age, a dummy variable for matched group, the variables for time and a dummy variable to indicate pluckers who went on to an AIDS-related termination.
† Difference in kilograms.
‡ Expressed as a per cent of the average kilograms plucked by comparison pluckers, 41.

"Pre" $t=0$

Diff$_0$ = +1%

"Post" $t=1$

Diff$_1$ = −17%
Taking the difference-in-differences

• The difference-in-differences (DD) estimator takes the differences between equations (2) and (3) to eliminate omitted variable bias and deliver the true effect:

Equation (2) – Equation (3)

\[ \{E(Y_{i1} | T_{i1}=1) - E(Y_{i1} | T_{i1}=0)\} - \{E(Y_{i0} | T_{i1}=1) - E(Y_{i0} | T_{i1}=0)\} \]
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The difference-in-differences (DD) estimator takes the differences between equations (2) and (3) to eliminate omitted variable bias and deliver the true effect:

\[ \text{Equation (2) – Equation (3)} \]
\[ = \{E(Y_{i1} \mid T_{i1}=1) - E(Y_{i1} \mid T_{i1}=0)\} - \{E(Y_{i0} \mid T_{i1}=1) - E(Y_{i0} \mid T_{i1}=0)\} \]

\[ = \text{Diff}_1 - \text{Diff}_0 = (-17\%) - (+1\%) = -18\% \]
Interpreting Fox et al.’s (2004) results

• Including absenteeism, final year income drops 35%
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• Some controls are also likely ill with HIV/AIDS, leading the estimated T–C difference to be a lower bound. The decline over time in C productivity may be AIDS related
Figure 1 Mean kilograms of tea plucked per day on days of plucking for cases and controls (univariate analysis – curves are trend lines fit using polynomial regression for each group. Note that vertical access scale begins at 30 kg/day).
Interpreting Fox et al.’s (2004) results

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• Sick workers often have family member “helpers”. So estimates are again likely to be lower bounds
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• Is the assumption of no time-varying omitted variables reasonable? AIDS victims have higher absenteeism three years prior. What is the right “counterfactual”? 
Key questions in the study of HIV/AIDS

(0) Measuring the extent of the problem (today)

(1) What impact does HIV/AIDS have on economic development in Africa?
   -- Labor productivity / labor turnover
   -- Human capital accumulation (orphans)
   -- Investment and savings (as time horizons change)
Parent death and school participation in Kenya

• Evans and Miguel (2005) study the impact of parent death on school participation among primary school children in Kenya (using the deworming project dataset)

• Parent death leads to a drop of at least 5-6 percentage points in school participation
  – Impacts are particularly negative following maternal deaths, and for worse students
### How do orphans, others compare at baseline?

<table>
<thead>
<tr>
<th></th>
<th>Became Orphans</th>
<th>Never Orphans</th>
<th>B-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997 School participation</td>
<td>0.83</td>
<td>0.81</td>
<td>0.02 (0.03)</td>
</tr>
<tr>
<td>1998 School participation</td>
<td>0.92</td>
<td>0.92</td>
<td>0.00 (0.01)</td>
</tr>
<tr>
<td>Weight-for-age (Z), 1998</td>
<td>-1.40</td>
<td>-1.45</td>
<td>0.05 (0.03)</td>
</tr>
<tr>
<td>Malaria in last month, 1998</td>
<td>0.40</td>
<td>0.39</td>
<td>0.01 (0.02)</td>
</tr>
<tr>
<td>Household has a latrine, 1998</td>
<td>0.81</td>
<td>0.82</td>
<td>-0.02 (0.02)</td>
</tr>
<tr>
<td>Household owns cattle, 1998</td>
<td>0.49</td>
<td>0.49</td>
<td>-0.00 (0.02)</td>
</tr>
</tbody>
</table>
Figure 1: Parent death and school participation over time (relative to four years prior to parent death)
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Key questions in the study of HIV/AIDS

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(1) What impact does HIV/AIDS have on economic development in Africa?

(2) Why does HIV/AIDS continue to spread in Africa?

(3) What can / should public policy do about HIV/AIDS?
Key questions in the study of HIV/AIDS

(0) Measuring the extent of the problem (today)

(1) What impact does HIV/AIDS have on economic development in Africa?

(2) Why does HIV/AIDS continue to spread in Africa?

(3) What can / should public policy do about HIV/AIDS?
Why does HIV continue to spread?

• Lack of information, awareness about HIV/AIDS?
  – Probably not a good explanation anymore

• What else?
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
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  – \( P \in (0,1) \) if HIV-
  – \( P^{HIV} \in (0,P) \) if HIV+, so \( P^{HIV} < P \)
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• Value of unsafe sex: \( S > 0 \)
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• 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

\[ EU \text{ (Safe sex)} = V + \{PV + (1 – P)\times0\} = V(1+P) \]
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\[
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Key term: benefits of unsafe sex (financial, physical, etc.)
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\[EU\ (Unsafe\ sex) = \{V+S\} + \{P^{HIV}V + (1 – P^{HIV})*0\} = V(1+P^{HIV}) + S\]
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- Assume unsafe sex always leads people to be HIV+

\[ EU\ (Unsafe\ sex) = \{V+S\} + \{PHIVV + (1 - PHIV)^*0\} \]
\[ = V(1+PHIV) + S \]

- \( EU\ (Unsafe\ sex) - EU\ (Safe\ sex) = S + V(PHIV - P) > 0 \)
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  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+

\[
EU \ (\text{Safe sex}) = V + [RP_{\text{HIV}} + (1 - R)P]V
\]
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$$EU \ (Safe \ sex) \ = \ V \ + \ [RP_{HIV} \ + \ (1 - R)P]V$$

$$EU \ (Unsafe \ sex) \ = \ V(1+P_{HIV}) \ + \ S \quad (UNCHANGED)$$
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  \[
  EU \text{ (Safe sex)} = V + [RP^{HIV} + (1 - R)P]V
  \]

  \[
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  \]

- $EU \text{ (Unsafe sex)} - EU \text{ (Safe sex)} = S + V(P^{HIV} - P)(1 - R) > 0$
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\]

\[
EU \text{ (Unsafe sex)} - EU \text{ (Safe sex)} = S + V(P_{HIV} - P)(1 - R) > 0
\]

“Nothing to lose”: cost of unsafe sex smaller than before
Why does HIV spread? An extension

• 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)?
What is this model missing?

(1) People are altruistic

- Allow the benefits of unsafe sex to be a function of $R$:
  \[ S = S(R) \]. This may offset the “nothing to lose” effect
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(2) Not all sexual choices are voluntary (e.g., rape)
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(1) People are altruistic
   - Allow the benefits of unsafe sex to be a function of $R$: $S = S(R)$. This may offset the “nothing to lose” effect

(2) Not all sexual choices are voluntary (e.g., rape)

(3) Social / cultural norms regarding “acceptable” sexual behavior, especially regarding safe sex

(4) Pockets of poor information about HIV/AIDS

(5) Others?
What can public policy do about HIV/AIDS?

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(6) Development of an HIV vaccine
• For next time: finish the HIV/AIDS section
Whiteboard #1