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Awareness and AIDS: A Political Economy Model

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Awareness and AIDS: A Political Economy Model[*]

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Abstract

We present a simple political economy model that explains two major puzzles of government policies to combat HIV/AIDS epidemic: the lack of policy response in many countries where the epidemic is massive and the reversal of the downward trend in HIV prevalence in the countries that have adopted early agressive prevention campaigns. The model builds on the assumption that the unaware citizens impose a negative externality on the aware by increasing the risk of contagion. Prevention campaigns raise awareness of the current generation, which then partially transmit this awareness to the next generation, thus creating political support for the next-period awareness campaigns. The economy has two steady-state equilibria: the 'good' one (with high awareness and low prevalence) and the "bad" one (low awareness, high prevalence). The "good" equilibrium is fragile, i.e. a sufficiently large exogenous drop in HIV prevalence undermines the next-generation political support for campaigns and makes the economy drift away towards the "bad" equilibrium.

Keywords: HIV/AIDS, voting, overlapping generations, awareness.
JEL Classification: I18, H51.

1   Introduction

The HIV/AIDS epidemic is a major social and economic problem that afflicts many developing countries. For the countries in Sub-Saharan Africa, it is perhaps the main problem that - because of the extremely high prevalence rates and associated mortality rates - has been having devastating effects on the lives of citizens in this part of the world. While now we understand how the disease acts on human organism and how it spreads better than a decade ago (see Barrett and Whiteside (2006) for an excellent review), our knowledge of the social side of the problem, i.e. how societies have been tackling the HIV/AIDS epidemic is more limited.

When looking at the way different countries affected by the HIV/AIDS epidemic have been reacting to the disease, we see two puzzling facts. First, the countries that are most hit by the epidemic are not, on average, reacting more to it than the countries less affected by the disease. One measure of the policy actions taken against the disease is the AIDS Program Effort Index (the API score) constructed by the USAID, UNAIDS, and WHO (USAID et al. 2003). It is a survey-based measure of effort put by national governments to combat HIV/AIDS. Figure 1 plots the average API score in 2001-2003 against the HIV prevalence rate among adults aged 15-49, for the countries for which the API scores in those two years are available. We note that the countries with the highest prevalence rates (reaching over 30 per cent in several African countries) have, on average, only slightly higher API scores than the countries with relatively low prevalence rates.

[**Figure 1 about here**]

One obvious explanation would be the malfunctioning of the political system in most of these countries. For instance, the lack of political accountability is a well-known malaise of Sub-Saharan African countries (Van de Walle 2001). However, if we look at the opinions of ordinary citizens, the puzzle gets stronger. Figure 2 shows the results of the surveys conducted in seven Southern African countries by Alan Whiteside and his colleagues. It plots on the horizontal axis the percentage of respondents that declare to have personally known someone who died of AIDS, and on the vertical axis - the percentages of respondents who consider health and HIV/AIDS as most important problems. Whereas for countries where fewer citizens know someone who died of AIDS we observe that considering health and HIV/AIDS increase with disease awareness and move together, for the countries with

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the higest shares of people that know someone who died of AIDS, considering HIV/AIDS as a most important problem falls sharply.

[**Figure 2 about here**]

This finding reveals the problem of HIV/AIDS 'denial' that many commentators have been describing. For instance, Jacob Bor (2007) argues:

> "The failure of elected leaders to respond to AIDS may reflect a rational response to the demands of their constituents. Africans consistently rank HIV/AIDS low among their political priorities, preferring government action on unemployment, the economy, poverty, water, and crime." (Bor 2007)

Similarly, Alan Whiteside et al. (2004) state that

> "Southern Africans simply do not list HIV/AIDS as a political priority for their governments ... it could be that people see the responsibility for HIV/AIDS to lie with individuals and communities rather than governments, perhaps because they do not believe that governments have the ability to deliver in this area." (Whiteside et al. 2004)

Thus, this puzzle can be summarized as follows: how can this absence of policy response to HIV/AIDS exist in the countries with such high prevalence rates? This is especially striking given than the policy success stories (i.e. the countries where governments took active measures against the disease, e.g. Uganda, Thaliand, Senegal, Philippines, and Brazil) have caused the HIV prevalence rates fall sharply. How can we explain these two strikingly different paths: on the one have, countries with extensive anti-HIV/AIDS policies and low prevalence rates, and on the other - countries with very limited policy response even in the face of extremely high prevalence?

The second puzzle emerges when we look at the evolution of the HIV/AIDS in the population across time in countries that have experienced an early fall in the disease prevalence, caused by the active policies adopted by their governments. Figure 3 comes from a recent research paper by Oster (2008), where she constructs a measure of HIV incidence in Uganda between 1983 and 1995. We can see that the early fall in HIV incidence coinciding with the 1986 prevention campaign lauched by President Museveni is followed by the sharp rise starting around 1993.

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A similar picture emerges when we look at the evolution of the HIV incidence in Brazil. Figure 4 illustrates the evolution similar to the one in Uganda: the fall between 1998 and 2001 is followed by the rise after 2001.

The puzzle emering from these figures is why the success stories can get reversed? Why the policy actions that have been seemingly very effective in reducing the disease incidence and prevalence loses its effect or gets abandoned?

This paper presents a simple political economy model that explains these puzzles. We build it around the assumptions that HIV/AIDS prevention campaigns have some effectiveness and that the aware individuals prefer the government to spend money on prevention campaigns (because of the negative externality that unaware individuals impose on the aware; in other words, private prevention is not sufficient to eliminate the risk of contagion). The key idea of the model is that the awareness created by current-period prevention campaigns transmits - through parents to children - into the next generation, thus creating the next-period political support for the prevention campaigns. There are three types of agents: aware, unaware and conservative. The two latter groups are opposed to government spending on prevention. Therefore, the positive government spending on prevention becomes an equilibrium only when the share of aware citizens is sufficiently high to constitute the majority.

Instead, the disease transmits both across and within generations. It transmits from the old to the young through the sexual contacts between the elder sick individuals and the young unaware citizens. It then transmits within the young generation through sexual contact between the young.

Because of the two-way relationship between prevention policy and awareness described above, we find that there exist two stable steady-state equilibria: one with high share of aware citizens and low HIV prevalence, and the other - with low awareness and high prevalence. We study the comparative statics properties of the steady-state equilibria, and also analyze the short-run dynamics of the economy. Notably, we find that the "good" equilibrium (i.e. the one with low HIV prevalence) is fragile, meaning that a sufficiently large exogenous drop in HIV prevalence makes the economy drift away to the "bad" equilibrium, because the

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fall in prevalence also means a fall in political support for further goverrnment spending on prevention. We also discuss the role of NGOs and foreign donors in prevention, and find that in order to have permanent reduction effects on HIV prevalence, these outside interventions should be sufficiently large to create a self-sustaining political support.

Next, we discuss several case studies that allow us to evaluate the theoretical model. In particular, we look at the political-economic factors behind government policies in Uganda, Brazil, Kenya, South Africa, and Thailand.

The paper is organized as follows. Section 2 presents the theoretical model, with Section 2.1 describing the model's setup, Section 2.2 deriving the steady-state political-economic equilibria, Section 2.3 looking at their comparative statics properties, and Section 2.4 analyzing the short-run dynamics of the model. Section 3 concludes by discussing the potential effects of relaxing the model's basic assumptions on our results, the limitations of the model, and the possible extensions.

2   Model

2.1   Setup

Consider an overlapping-generations economy populated in each period $t = 0, 1, 2, ...$ with two types of atomistic agents: old (O) and young (Y). The size of each cohort is constant and equals 1. Each agent lives for two periods. At the end of the first period of life, each agent has exactly one child. We are thus abstracting from the issues related to population growth. The next-period payoffs are discounted by the discount factor $\delta < 1$. Young agents work and get a fixed income normalized to 1. Old agents do not work.

Agents also differ in terms of their health status: each agent is either healthy (H) or sick (S). The proportion of sick in period 0 is $\alpha_0 > 0$.

Finally, agents also differ in terms of their position with respect to the government policy towards the disease. We assume that the proportion $1 - \gamma$ of agents is conservative (c): these agents engage only in safe sex and a priori are opposed to any government action towards the disease. The remaining fraction of agents; $\gamma \in (0, 1)$, are either aware (a) about the existence of a simple costless technology effective in reducing the spread of the disease (for instance, safe sex practices), or are unaware (u) about it. The policy support comes only from the aware agents. At time t, the proportion of young agents that are aware of the potentially beneficial government action is denoted by q_t^y. This proportion will be determined

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endogenously.

There are three sources of awareness for the young agents:

(1) inter-generational transmission (via parents or elder relatives trying to inform their children or, more generally, via interactions with older citizens in social networks), measure by the parameter $\chi \in (0,1)$;

(2) information campaigns conducted by NGOs;

(3) government policy: information campaigns.

Summarizing these three channels, the proportion of young aware agents in period t is:

$$q_t^y = \chi q_{t-1}^y + q_{Nt} + q_{Pt}, \tag{1}$$

where q_{Nt} and q_{Pt} are the fractions of young agents that get informed via NGOs and government policies, respectively. We are thus implicitly assuming that the NGO and government campaigns are perfectly targeted to unaware agents.

Concerning the government policy, the unit cost of the government information campaign is p. The information campaigns are financed by a lump-sum tax on all working agents. Government cannot run deficits. The period-t government budget constraint is then simply:

$$\tau_t = p q_{Pt}, \tag{2}$$

where τ_t is the period-t tax.

The disease gets transmitted via sexual contact. For simplicity (and withoutt loss of generality), we assume that the transmission rate from a sick partner to a healthy one, in the absence of preventive action, is 1. The technology to prevent disease transmission works as follows. If both partners in the sexual intercourse apply the technology, the risk of transmission is zero. If only one of the partners applies the technology, the transmission rate is $1 - \Phi$. Note that this a stylized representation of the existing prevention technologies (condoms, safe sex). The main point of such modelling choice is to capture the idea that private preventive action is not sufficient to insulate oneself fully from the risk of catching the disease.

The disease trasmits first inter-generationally and then within the young generation. All agents are born healthy. We assume that young aware agents abstain from having sex with the partners from the older generation. Young unaware agents have sex with a member of the old generation with probability $\theta \in (0,1)$. Then, denoting with $\alpha_t^{i,j}$ the probability of

being sick for an agent of age $i \in \{y, o\}$ and awareness type $j \in \{a, u\}$, we get the following relations that describe the inter-generational disease transmission:

$$\alpha_t^{y,a} \quad = \quad 0, \tag{3}$$

$$\alpha_t^{y,u} \quad = \quad \theta \left[q_{t-1}^y (1 - \Phi) \alpha_t^{o,a} + (1 - q_{t-1}^y) \alpha_t^{o,u} \right]. \tag{4}$$

The expression in square brackets in (4) is the probability that a partner from the older generation is sick. $\alpha_t^{o,a}$ is the prevalence of the disease among the old aware agents, the probability that a young unaware agent enters a match with such a partner is $q_t^o = q_{t-1}^y$, and the transmission rate in this match is $1 - \Phi$. Similarly, $\alpha_t^{o,u}$ is the prevalence rate among the old unaware, and the probability of entering a match with this type of agent is $1 - q_{t-1}^y$ (the transmission rate in this match is 1).

Next, non-conservative young agents engage in sexual behavior with one randomly chosen partner. The health status of a young agent is discovered in the next period. Given that the technology to prevent disease transmission is the same as described above, any young agent's probability of finding herself sick when old is given by:

$$\Pr(S_{t+1}^{o,a}) \quad = \quad \alpha_{t+1}^{o,a} = \alpha_t^{y,u}(1 - \Phi)(1 - q_t^y), \tag{5}$$

$$\Pr(S_{t+1}^{o,u}) \quad = \quad \alpha_{t+1}^{o,u} = \alpha_t^{y,u} + (1 - \alpha_t^{y,u})\alpha_t^{y,u}(1 - q_t^y). \tag{6}$$

The aware young agent is healthy before entering the sexual relationship within her generation. The only channel through which she can catch the disease is by having sex with an unaware sick partner. The prevalence of the disease among the young unaware agents is $\alpha_t^{y,u}$ and the probability of entering a match with such a partner is $1 - q_t^y$ (the transmission rate being $1 - \Phi$).

On the contrary, the unaware young agent can be sick already before having sex within her generation (as she can catch the disease from the older generation), the probability of this event being $\alpha_t^{y,u}$. In addition, if healthy (with probability $1 - \alpha_t^{y,u}$), she can catch the disease from the sexual contact with a sick partner within her generation: the probability of meeting an unaware sick partner is $(1 - q_t^y)\alpha_t^{y,u}$ (remember that all young aware are healthy before the within-generation sexual contact) and the transmission rate is 1.

The corresponding probabilities of being healthy, $\Pr(H_{t+1}^{o,i})$, for $i \in \{a, u\}$, are simply $1 - \Pr(S_{t+1}^{o,i})$.

Aware agents understand that these probabilities are influenced by government policies, while unaware agents consider them as constants (with respect to government actions).

Given that the health status is revealed only in the beginning of the second period of life, the ex ante utility of the agent of type $i \in \{a, u, c\}$ is

$$U_t^i = v(1 - \tau_t) + \delta[\Pr(H_{t+1}^{o,i})(1 + \Delta)\Omega + \Pr(S_{t+1}^{o,i})\Omega], \qquad (7)$$

where $v(.)$ is a concave function, Ω is the (exogenous) utility of a health agent when old, and Δ is the utility loss caused by illness (e.g. shortened lifetime of the sick agent).

The within-period timing of events for a young agent is as follows:

- The agent inherits the conservativeness or awareness from from older generation (inter-generational transmission of awareness);

- All young agents work and produce income y normalized to 1.

- Simple majority voting on the size of the goverment policy occurs, with only the young having the right to vote. The vote is open agenda referendum. The Condorcet-winner policy is implemented;

- NGOs and the government inform the measures q_{Nt} and q_{Pt} of young agents, respectively.

- Unaware young agents engage in sex with the older generation (inter-generational transmission of the disease).

- All young agents are randomly matched into couples and have sex (within-generation tranmission of the disease). The end-period health status is determined (still unknown by the agents). One child is born to each young agent.

The timing of events within a period for the old agent is as follows:

- The health status of the agent is revealed;

- If the agent is healthy, she enjoys the payoff of $(1 + \Delta)\Omega$; if she is sick, she gets the payoff of Ω. Old agents neither work nor vote.

For simplicity we assume that the NGOs conduct the campaigns of identical extent in each period:

$$q_{Nt} = q_N \quad \text{for any } t.$$

2.2 Political-economic equilibrium

Let's now derive policy preferences of different types of young agents (old agents do not vote, thus their preferences play role in the political-economic equilibrium):

- Conservative and unaware agents prefer zero policy (and zero taxes), as they consider the policy only as a tax burden, with no benefits accruing to them;

- Aware agents prefer a positive amount of policy. This is because sick agents impose a negative externality on the healthy ones: the technology that prevents disease transmission works imperfectly if only one of the partners uses it. Thus, the aware young agents (that are initally healthy) trade the tax cost of the policy against the benefit of internalizing this negative externality, by reducing the number of unaware agents (remember that if both agents are aware, the disease transmission is fully prevented).

More precisely, the ex ante utility of the aware agent is

$$U_t^a = v(1 - pq_{Pt}) + \delta[(1 - \alpha_{t+1}^{o,a})(1 + \Delta)\Omega + \alpha_{t+1}^{o,a}\Omega], \tag{8}$$

where $\alpha_{t+1}^{o,a}$ is described by (5).

Using (1) in (5), and maximizing (8) with respect to the policy variable q_{Pt}, we get the following first-order condition:[1]

$$pv'(1 - pq_{Pt}) = \delta\Delta\Omega\alpha_t^{y,u}(1 - \Phi). \tag{9}$$

The left-hand side of (9) describes the marginal cost of a larger government policy (a decrease in the utility caused by lower post-tax income), while the right-hand side describes the marginal benefit: larger policy reduces the risk of transmission of the disease by the amount equal to $\alpha_t^{y,u}(1 - \Phi)$, and this marginal reduction is multiplied by the discounted differential utility of being healthy (as compared to being sick) when old, $\delta\Delta\Omega$.

Note that the higher is the fraction of potential unaware sick partners in the young population, $\alpha_t^{y,u}$, the larger is the marginal benefit of the government policy for the aware voter. Obviously, since the extent of the negative externality is larger, the aware voter would prefer a more agressive government information campaign. Also note that as Φ approaches 1, the support of the aware voter for the government policy declines, because the private solution

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[1]The problem is concave, so the second-order condition is satisfied.

to the disease transmission problem (i.e. the unilateral use of the prevention technology) becomes more effective. In other words, private and public solutions to the disease transmission act as substitutes.

Given these policy preferences of different types of voters, the set of possible configurations of political-economic equilibrium is simple: aware voters constitute the majority (positive-policy equilibrium); unaware voters plus the conservatives constitute the majority (zero-policy equilibrium). Thus, the preferred policy of the aware voters (described by the equation (9)) is implemented if and only if

$$\gamma \chi q_{t-1}^y \geq (1 - \gamma) + \gamma(1 - \chi q_{t-1}^y), \tag{10}$$

or, in other words, if and only if

$$q_{t-1}^y \geq \frac{1}{2\gamma\chi}. \tag{11}$$

A few important points should be noted about the mechanism behind this political-economic equilibrium. The awareness gets transmitted across generations through families and networks. Being an unaware young citizen implies two negative effects on the overall health conditions in the economy. On the one hand, it implies the transmission of ignorance to the next generation, thus adding to the vote against a positive policy. On the other hand, it implies the inter-generational transmission of the disease, via the risk of the early infection from risky sex with the older generation. Note also that the government policies do not affect the current voters: the political mechanism is such that the young voters made aware in period t transmit this awareness (imperfectly) to theis children who vote in period $t + 1$.

We now turn to determining steady-state equilibria (which in our setup imply constant levels of disease, α, and awareness, q, in the population).

Using (5)-(6), we can rewrite (3)-(4) in period $t + 1$ as

$$\alpha_{t+1}^{y,a} = 0, \tag{12}$$
$$\alpha_{t+1}^{y,u} = \theta \left[(1 - q_t^y)\alpha_t^{y,u} + (1 - q_t^y)^2(1 - \alpha_t^{y,u})\alpha_t^{y,u} + q_t^y(1 - q_t^y)(1 - \Phi)^2\alpha_t^{y,u} \right]. \tag{13}$$

Solving (13) for the steady-state values, we get

$$\alpha^{y,u} = 1 - \frac{1}{\theta(1 - q^y)^2} + \frac{1 + q^y(1 - \Phi)^2}{(1 - q^y)} = \alpha(\bar{q}^y). \tag{14}$$

Higher fraction of young aware agents leads to a lower steady-state level of the disease among the unaware agents. This occurs via two channels: (1) the aware agents do not inherit

the disease from the older generation; (2) the aware agents use the prevention technology which slows down the spread of the disease within the young generation.

Furthermore, let's assume that the sub-utility function $v(.)$ is logarithmic. Then, the first-order condition (9) in the steady-state gives us the following expression for the preferred policy of the aware agents:

$$q^y = \frac{1}{p} - \frac{1}{\delta \Delta \Omega (1 - \Phi) \alpha^{y,u}} = q(\overset{+}{\alpha^{y,u}}).$$ (15)

Clearly, the higher is the fraction of sick young (unaware) agents, the larger is the preferred policy of the aware, as the negative externality becomes stronger.

Finally, the majority needed to support this policy in the steady-state is found from (11):

$$q^y \geq \frac{1}{2\gamma\chi}.$$ (16)

(14), (15), and (16) jointly describe the steady-state equilibria of the model. Figure 5 represents these equilibria graphically.

[**Figure 5 about here**]

We can thus state the following

Proposition 1 *There are two steady-state equilibria: one with zero policy, zero awareness (in the absence of NGO activities), and high prevalence of the disease in the population, and the other with positive policy, high awareness, and low prevalence of the disease.*[2]

On the right of the majority support line (16), the steady-state political economic equilibrium must satisfy two conditions. Since the aware voters constitute a majority, the size of the government policy must reflect the preferences of the aware voters, for any level of the disease in the population. Thus, the equilibrium point must lie on the green ("preferred-policy") line, described by the equation (15). Secondly, the dynamics of the disease spread must have stabilized around its steady-state level. In other words, the equilibrium point must lie on the blue ("AIDS epidemics") line, described by the equation (14). Given that the relations (14) and (15) are monotonic, there is only one intersection point, which contemporaneously satisfies both relations.

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[2]There also exists a third steady-state equilibrium with zero prevalence. However, it is unstable, so we do not consider it in our analysis.

On the left of the majority line, the aware voters constitute a minority and thus the equilibrium policy reflect the preferences of conservative and unaware voters: equilibrium size of the policy is therefore zero. The dynamics of the spread of the disease is still determined by (14). Therefore, the equilibrium is the highest point of the "AIDS epidemics" line. It is easy to verify that both equilibria are stable.

Intuitively, the first ("good") equilibrium has a relatively high fraction of young aware voters. These voters are sufficiently numerous to constitute a majority, which means that suubsequent-period government information campaigns are relatively large. These policies internalize the negative externality and induce a realtively low inter- and intra-generational spread of the disease in the population. Moreover, there are also a sufficiently high number of aware voters in the next period (because of the inter-generational transmission of awareness), which guarantees that the positive policy is voted in the subsequent periods. In the second ("bad") equilibrium the majority is constituted of the conservative and unaware voters, which means that the government implements zero prevention campaigns. This implies a strong inter- and intra-generational transmission of the disease, which leads to a high prevalence. Also, the inter-generational transmission of awareness is absent, which implies that the zero policy is voted in the future.

This mechanism is the answer to the first puzzle described in the introduction and explains why different countries subject to the high risk of the spread of the disease have followed such strikingly different paths of both government actions agains HIV/AIDS and the spread of the disease. It also helps to understand why many African countries with extremely high rates of prevalence fail to take any serious government action against the epidemic.

2.3   Comparative statics

The steady-state equilibria are fully parameterized by the set $(p, \Delta, \delta, \Phi, \theta, \gamma, \chi)$. We can now analyze the comparative statics properties of equilibria with respect to some of these parameters.

Proposition 2 *An increase in the inter-generational transmission of the disease (θ, the probability of sexual contact between the young unaware and the old agents) increases equilibrium prevalence. If the economy is in the "good" equilibrium, the equilibrium awareness also increases, which softens the rise in prevalence.*

A change in sexual behavior that increases contacts between the young unaware and the old would shift upwards the "AIDS epidemics" curve, i.e. increase the disease prevalence for any level of the awareness, simply because the disease precipitates more from the older generation to the younger one. If the economy is in the "bad" equilibrium, given that the equilibrium policy is zero, this increase in θ translates entirely into higher equilibrium prevalence. This occurs because the policy does not react as the prevalence starts to rise.

Contrarily, if the economy is in the "good" equilibrium, the equilibrium policy (which reflects the preferences of the aware citizens) responds to changes in prevalence. Thus; as prevalence starts to rise, aware citizens vote for a larger policy. The increase in the policy never counterweighs fully the rise in prevalence, so the at the new equilibrium, the prevalence is higher, even though the increase is smaller than it would be in the case of the "bad" equilibrium.

Proposition 3 *If the economy is in the "good" equilibrium, an decrease in the unit price of the government awareness campaign (p) or an increase in the utility differential (Δ) of healthy old (as compared to the sick) reduces prevalence and increases awareness. The effect is nil if the economy is in the "bad" equilibrium.*

If awareness campaigns become cheaper, the marginal benefit of the campaigns increases. Then, the aware voters would prefer a larger policy (a rightward shift in the "Preferred policy" curve), which, in the "good" equilibrium, would imply that the equilibrium policy would increase. This increase in the policy reduces the inter- and intra-generational transmission - and therefore, the spread - of the disease, which would soften the initial spike in the policy. This softening, however, does not outweigh the initial policy action, which means that the equilibrium exhibits a lower prevalence and a higher awareness. Obviously, if the aware voters constitute a minority, this shift in their preferred policy has no effect on the equilibrium policy.

Note another interesting implication of this result. Suppose the better anti-retroviral drugs increase the lifetime of the sick (and/or ease their sufferings). In our model, this would imply a *reduction* in the utility differential between the sick and the healthy. This - if we are in the "good" equilibrium - would translate into smaller government awareness programs and higher equilibrium prevalence of the disease. This outcome would reflect the preferences of the aware voters. Therefore, if expenditures on treatment were endogenous, our model would exhibit a political substitutability between treatment and prevention.

Proposition 4 *An increase in the effectiveness of private prevention (i.e. the fall in the transmission rate $1 - \Phi$) reduces the equilibrium awareness. If the economy is in the "good" equilibrium, it might increase or decrease equilibrium prevalence.*

Better private prevention (higher Φ) affects both relations, (14) and (15). The "AIDS epidemics" curve shifts downwards, because the disease spreads less, both inter- and intra-generationally. The "Preferred policy" curve shifts leftwards, because better private prevention means that the negative externality is weaker and thus the marginal benefit of policy is smaller, from the aware voters' point of view. As a result, the equilibrium awareness (if we are in the "good" equilibrium) unambiguously declines. The effect on the prevalence is unclear, because the two effects - weaker epidemics and smaller policy - go in the opposite direction. The overall impact on the prevalence depends on the relative strengths of these two opposed forces.

Proposition 5 *If the awarenes in the "good" equilibrium is sufficiently close to the majority-rule awareness threshold, a decrease in the intergenerational transmission of the disease or awareness (lower θ or χ), higher share of conservative agents (lower γ), better private prevention (higher Φ), higher unit price of policy (higher p), or a lower utility premium on health (lower Δ) cause the "good" equilibrium to disappear.*

The changes described in the proposition correspond to either the rightward shift in "Majority support" line (lower χ or γ), the leftward shift in the "Preferred policy" curve (higher p, lower Δ, or higher Φ), or the downward shift in the "AIDS epidemics" curve (lower θ or higher Φ). If the level of awareness at the "good" equilibrium is sufficiently close to the majority-rule threshold, any of these shifts make the new "good" equilibrium fall to the left of the "Majority support" line, thus making the "good" equilibrium to disappear.

The economic intuition for this comparative statics is as follows. Let's start with changes in the transmission of awareness and in the share of conservative agents. Lower transmission of awareness across generations or a higher share of coservatives implies that the number of past-generation aware voters should be higher, in order to generate enough new aware voters (i.e. to couterweigh the reduction in transmission). In the steady-state, this means that the number of aware citizens should be higher. If the economy is in the "good" equilibrium but the existing number of aware voters is sufficiently close to the threshold, these changes imply

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that existing number of aware voters becomes insufficient to create the majority at the vote. Thus, the "good" equilibrium disappears.

Higher unit price of the policy, lower utility differential between the healthy and the sick, or a better private prevention, all reduce the marginal benefit of the policy for aware voters, and thus their preferred policy becomes smaller (for any level of prevalence). However, if the number of aware voters is sufficiently close to the threshold, this reduction in the policy size implies that in the next period, there won't be enough aware voters to constitute the majority, which means that the "good" equilibrium vanishes.

Similarly, a lower inter-generational transmission of the disease or a better private prevention reduce the spread of the disease for any level of awareness. This reduction in the negative externality implies lower perferred policy of the aware voters. If the number of aware voters is sufficiently close to the threshold, these changes lead to the same effect as described just above.

2.4   Short-run dynamics

We can now turn to the short-run dynamics of the economy. Figure 6 describes graphically the short-run behavior of the system.

[**Figure 6 about here**]

The following key results emerge from the analysis of Figure 6.

Proposition 6 *The "good" equilibrium is fragile, i.e. a sufficiently large drop in the disease prevalence implies that the economy does not return to the "good" equilibrium, but instead drifts away towards the "bad" equilibrium*

Suppose that the economy is initially in the "good" steady-state equilibrium. Now let the disease prevalence drop for some exogenous reason (for example, a fraction of sick get isolated). Suppose also that this drop in prevalence is sufficiently big (so as to fall below the dashed line). Then, the preferred policy of the aware (that so far consitute the majority) will be much smaller, which would imply that in the next period the fraction of aware voters is too low to constitute the political majority. Then, the economy drifts towards the "bad" steady- state equilibrium.

Note also that the fragility of the "good" equilibrium increases (in the sense that the drop in prevalence sufficient to make the economy drift away to the "bad" equilibrium), when the

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awareness in the "good" equilibrium is closer to the majority-rule threshold. This essentially means that if the conditions of the Proposition 5 are satisfied, the "good" equilibrium becomes very fragile. In other words, in this case the reversal of the economy to low-awareness high-prevalence equilibrum becomes more likely.

Proposition 6 can help to understand the second puzzle - in the case of Uganda - that we have discussed in the Introduction, i.e. why prevalence of the disease can raise after a substantial decrease even in the countries that have adopted early agressive anti-HIV/AIDS policies. Oster (2008) show that a substatial portion of the decline in HIV prevalence in Uganda was driven by the exogenous factor - reduction in the mobility of truck drivers caused by the fall in coffee prices. Our model predicts that if such drop in prevalence is sufficiently high, the next-period awareness campaigns will be so small as to undermine the majority needed to keep the economy in the "good" equilibrium.

In fact, the subsequent rise in HIV prevalence in Uganda can be explained by this reduction in political support for awareness campaigns. Mutabaazi (2006) argues that the reason why the prevalence is picking up again is the current reduction in the emphasis on condom use in the ABC campaign, in favor of the first two components. Moreover, the author cites the Uganda AIDS commission report that notes the increasing complacency in the population towards AIDS epidemic. Cohen et al. (2005) and Cohen and Tate (2006) argue that this policy shift towards "abstinence-only" comes from the pressure of religious leaders against condom use. Thus, the complacency in the general population caused by the early sharp reduction in the disease prevalence because of the exogenous factors (drop in truck driver mobility) has left the space to ABC policy opponents to obtain *de facto* majority and to scrap a key component of the policy, which is now driving the increase in prevalence. Therefore, unless NGOs and foreign donors put additional pressure to re-balance the ABC campaign, Uganda is likely to 'crawl up' to the "bad" equilibrium.

Proposition 7 *If the economy is in the "bad" equilibrium, the awareness activities by NGOs should be sufficiently large, in order to have a permanent positive effect.*

Suppose that the economy is initially in the "bad" steady-state equilibrium. Now let NGOs launch one-off information campaigns, which implies that the awareness increases exogenously (and the prevalence falls). If this increase in awareness is not sufficiently big, i.e. it does not create enough aware voters to constitute the majority, the next-period government policy will remain zero. This means that the awareness over time will fall and

the prevalence increase, making the economy crawl up along the "AIDS epidemics" line all the way back to the "bad" equilibrium.

Contrarily, let the NGOs' one-off campaign be sufficiently big to create enough aware voters to make the majority. Then, as in the next period the prevalence remains relatively high, aware voters vote for the maximum policy. This implies massive goverment information campaigns and the subsequent decrease in the prevalence. As prevalence starts to decline, aware voters vote for slightly smaller policy, and this process continues until the economy reaches the "good" steady-state equilibrium.

This proposition shows that erratic awareness campaigns by NGOs or foreign donors may temporarily lead the economy to the situation with high awareness and low prevalence, but once these campaigns are cut, the situation unravels and the economy moves back to the "bad" equilibrium. This calls for more stable outside interventions, to create the long-run sustainability of low prevalence.

3   Conclusion

Understanding the determinants of government policies against HIV/AIDS epidemics in developing countries, and, in particular, the gaping failure of some governments to respond to the massive disease spread, is a major challenge in development economics. This paper argues that this issue can be understood if the existence of a two-way relationship - from policy to awareness and from awareness to policy - is taken into account. Two stable long-run equilibria emerge, one with high prevalence and low awareness and the other with low prevalence and high awareness. Moreover, this latter "good" equilibrium is fragile, i.e. a large enough drop in prevalence erodes policy support to such extent that the economy drifts away towards the former "bad" equilibrium. We also characterize the proper policy for NGOs and foreign donors and stress the potential negative effect of discontinuous awareness campaigns by these entities.

Our model is built on several basic premises. First, the inter-generational transmission of the disease is via sexual contact between the old and the unaware young. The alternative assumption is that there exists the mother-to-child transmission (MTCT), which is zero if the mother is aware. The timing of event then needs to be changed slightly, but the qualitative results of the model are not altered. The reason why we have opted for our specification is that the relative importance of the MTCT as compared to the inter-generational sexual

contacts is limited. For instance, Beyrer, Gauri, and Vaillancourt (2005) report the evolution of new HIV/AIDS cases by mode of transmission: the weight of MTCT is negligible as compared to other modes, the most important being heterosexual contact (see also Barrett and Whiteside 2006: 354-355, for a discussion of current national and international actions taken to reduce the MTCT). Second, the role of conservative citizens is limited to voting. More realistically, they could dilute the effectiveness of government policies if campaign targeting is imperfect (as some of the campaign messages would be 'wasted' on conservatives) or they could play the role contrary to NGOs by, for instance, organizing campaigns against the use of condoms (see Kwena 2004 for the discussion of the case of Kenya). Both of these alternative assumptions would raise the majority-rule threshold, but the qualititative properties of our model would not change. Third, old citizens do not play any active role in the model. If no form of altruism is assumed, the old would always vote for zero policy (as they do not receive any benefit from positive policy), which would simply add an extra conservative weight. If we assume filial altruism (highly plausible in the societies with the so-called limited morality, see Banfield 1958 and Platteau 2000), the issue of strategic inter-period voting would arise. This additional complication would make the results of the model less clear cut, and we leave this issue for future research.

We do not treat two further important issues. One is the choice of the number of partners. Oster (2005) shows that although the differences between the U.S. and sub-Saharan Africa in the HIV prevalence are mainly explain by the difference in transmission rates, the differences in the number of partners coupled with risky sex practices is the key determinant of differences in the spread of HIV/AIDS within Sub-Saharan Africa. Our model assumes only one partner within the young generation. Introducing multiple partners and endogenizing the number of partners is the natural next step in understanding the political-economic dynamics of the epidemics. The other issue is the multidimensional policies. Most government policies combine prevention and treatment. The relative weight of these two large policy segments certainly vary across time and countries, and understanding the sources of this variation constitutes another key challenge in this research agenda.

As a final note, we would like to stress the applicability of our theoretical framework to more general problems of political economy of public health. Unfortunately, HIV/AIDS is only one of the many malaises that afflict most developing countries and government policies directed to combating these diseases are still studied very little from the political-economic
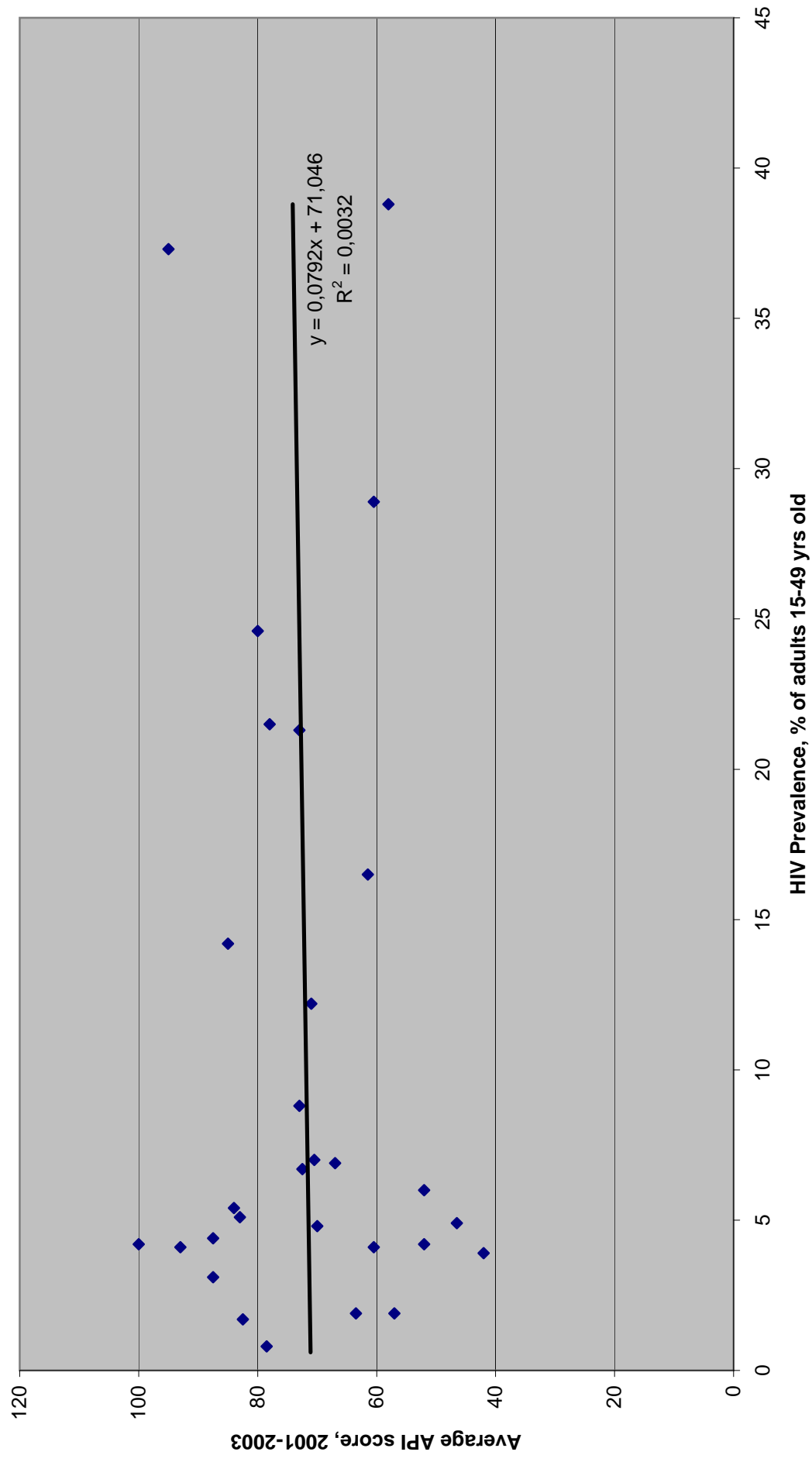
perspective. The basic building blocks of our model - disease and awareness transmission channels and political mechanisms that map conflicting preferences into equilibrium public health policies - would need to be adapted to the specific characteristics of a particular disease under scrutiny.
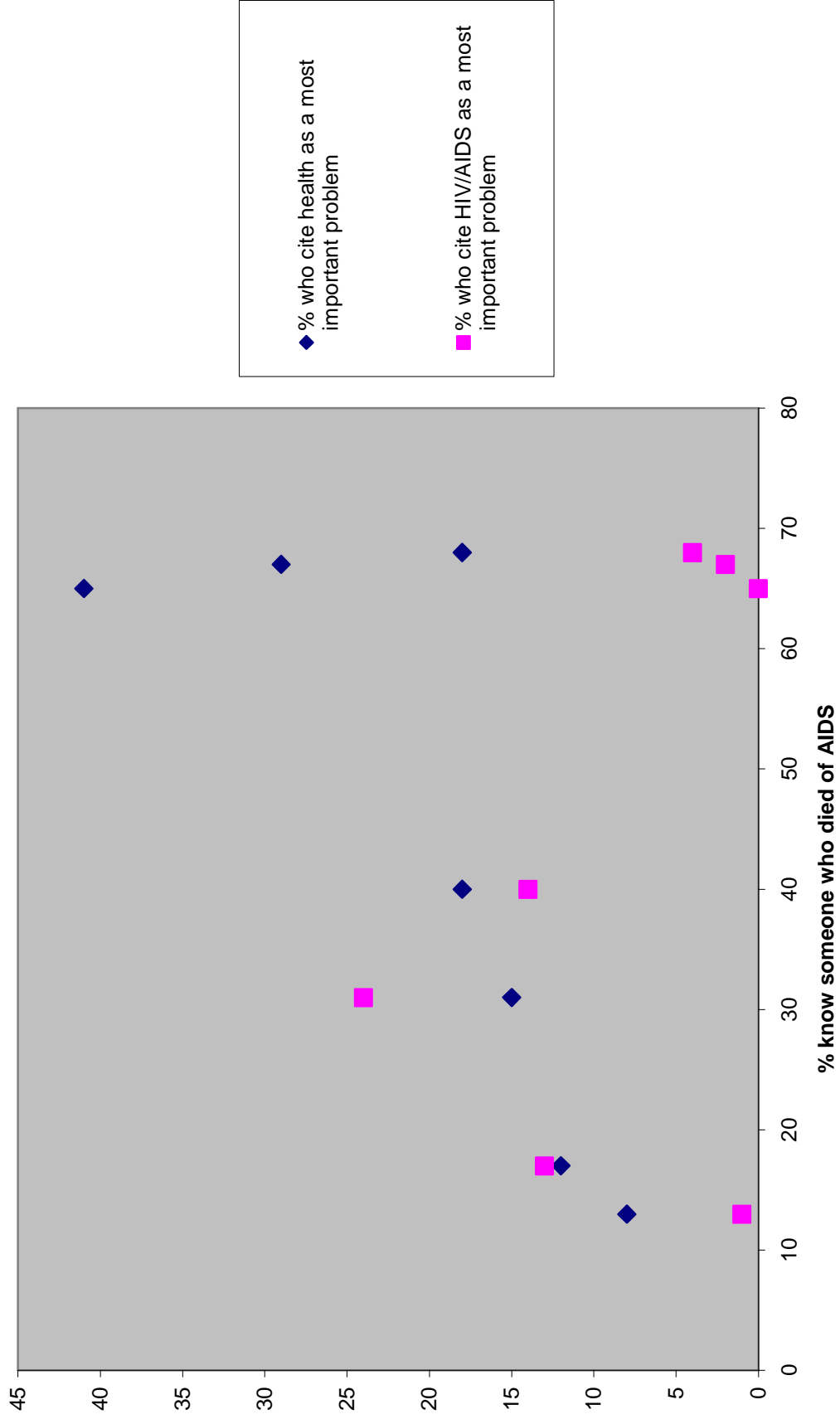
References

[1] Banfield, E. (1958). *The Moral Basis of a Backward Society*, New York: Free Press.

[2] Barnett, T., and Whiteside, A. (2006). *AIDS in the Twenty-First Century: Disease and Globalization*, 2nd ed. London: Palgrave Macmillan.

[3] Beyrer, C., Gauri, V., and Vaillancourt, D. (2005). "Evaluation of the World Bank's Assistance in Responding to the AIDS Epidemic: Brazil Case Study," OED Working Paper, Washington, DC: World Bank

[4] Bor, J. (2007). "The Political Economy of AIDS Leadership in Developing Countries: An Exploratory Analysis," *Social Science and Medicine* **64**: 1585-1599.

[5] Cohen J., Schleifer, R., and Tate, T. (2005). "AIDS in Uganda: the Human-Rights Dimension," *Lancet* **365**: 2075-2076.

[6] Cohen J., and Tate, T. (2006). "The Less They Know, the Better: Abstinence-Only HIV/AIDS Programs in Uganda," *Reproductive Public Health* **14**: 174-178.

[7] Kwena, Z. (2004). "Politics, Etiquette, and the Fight Against HIV/AIDS in Kenya: Negotiating for a Common Front," *Africa Development* **29**: 113-131.

[8] Mutabaazi, E. (2006). "Rise in HIV/AIDS Slaps Uganda in the Face," *UGPulse.com*, June 1.

[9] Oster, E. (2005). "Sexually Transmitted Infections, Sexual Behavior, and the HIV/AIDS Epidemic," *Quarterly Journal of Economics* **120**: 467-515.

[10] Oster, E. (2008). "Routes of Infection: Exports and HIV Incidence in Sub-Saharan Africa," University of Chicago, mimeo.

[11] Platteau, J.-Ph. (2000). *Institutions, Social Norms, and Economic Development*, Harwood Academic Publishers.

[12] USAID, UNAIDS, WHO, and the POLICY Project (2003). "The Level of Effort in the National Response to HIV/AIDS: The AIDS Program Effort Index (API) 2003 Round," Research report, Washington, DC: USAID.

[13] Van de Walle, N. *African Economies and the Politics of Permanent Crisis, 1979-1999.* Cambridge, UK: Cambridge University Press.

[14] Whiteside, A., Mattes, R., Willan, S., and Manning, R. (2004). "What People Really Believe About HIV/AIDS in Southern Africa," in Poku, N., and A. Whiteside (eds.), *The Political Economy of AIDS in Africa*, London: Ashgate.
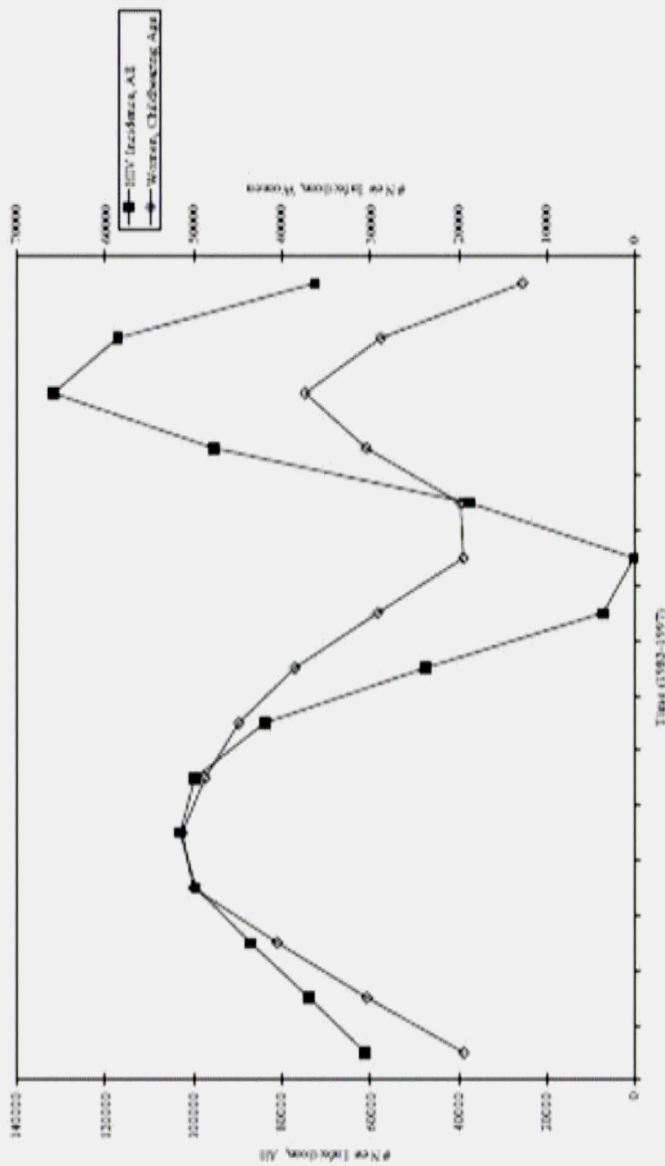
HIV Prevalence and Policy Effort

$y = 0{,}0792x + 71{,}046$
$R^2 = 0{,}0032$

Average API score, 2001-2003

HIV Prevalence, % of adults 15-49 yrs old

Exposure to AIDS deaths and citing health and HIV/AIDS as priority

% know someone who died of AIDS

Legend:
- ◆ % who cite health as a most important problem
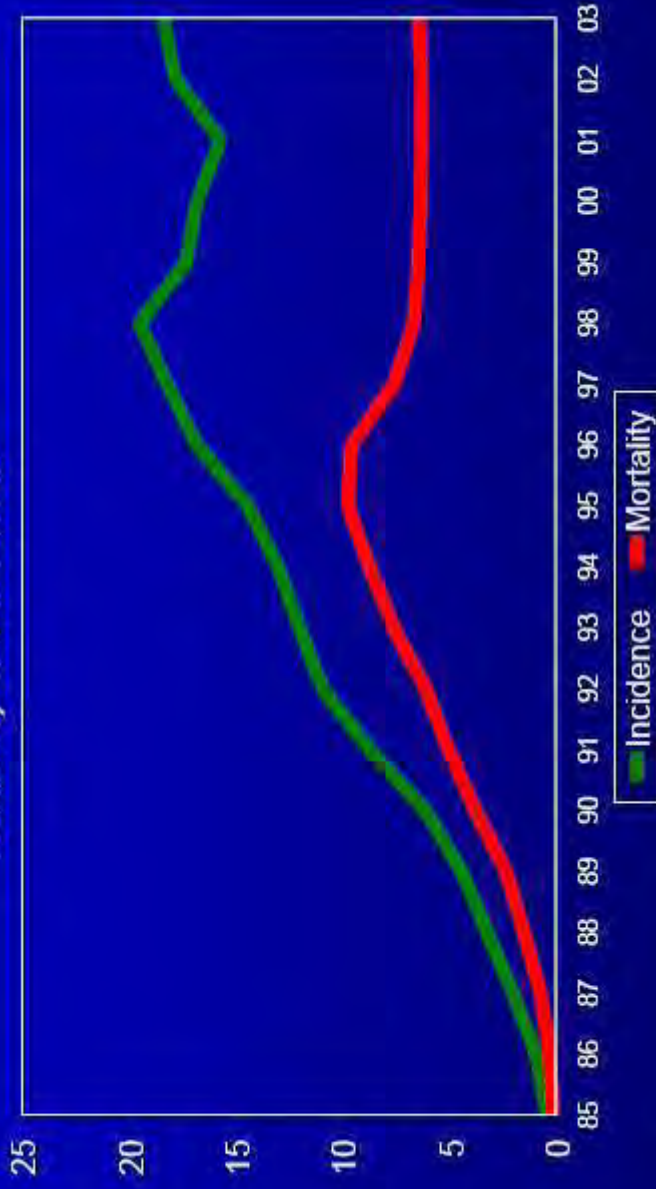- ■ % who cite HIV/AIDS as a most important problem

Appendix Figure 1:
HIV Incidence in Uganda, Two Groups

Note: This figure shows HIV incidence for Uganda, as calculated using the mortality-based methodology in this paper for 1983 through 1993 for the entire population, and women of child-bearing age.

AIDS incidence and mortality rates (by 100,000 inhabitants)
Brazil, 1985-2003

Incidence   Mortality

Sources: Incidence - PN STD-AIDS/SVS/MH.
Mortality – SIM/DASIS/SVS/MH

Ministério
da Saúde

alpha
high,
q=0

majority
support

Aids
epidemics

preferred
policy

alpha low,
q high

α

q

1