Choosing to be HIV positive? Economics, Epidemiology and HIV Prevalence.

Deborah Johnston

ABSTRACT

This paper investigates the currently fashionable extension of microeconomic methodology to the issue of HIV transmission. The context in which the popularity of such approaches has fluctuated is set out, as are some examples of the models themselves. While the availability of new data sets has been one of the drivers of the increased profile of microeconomic approaches, it is also clear that the microeconomic focus on individual behaviour has strong resonance with the dominant public health approach to HIV/AIDS. However, these microeconomic models are not always good predictors of the empirical record, and more than that, the way that individual choice is approached in such models is highly problematic. 'Choice' as understood by mainstream economists is likely to bear little reality to the sexual decision-making of many adults in areas affected by HIV/AIDS. Instead, this paper argues that individual coerced behaviour as well as their 'options' over sexual behaviour should be understood in terms of their structural context. By abandoning the narrow focus and flawed methodology of microeconomic models, a wider and more helpful consideration of the factors that determine HIV risk in any one place can be developed.

AN INTRODUCTION TO MODELS OF HIV PREVALENCE

The methodological approaches of mainstream economics have spread ever more widely, seemingly in response to the demand for useful frameworks to deal with a range of problems that traditionally have been the preserve of other disciplines. A less positive assessment sees this 'economics imperialism' as something that denudes the analytical and policy debate by

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restricting analysis to the factors that can be comfortably accommodated in a microeconomic framework (Fine and Milonakis, 2009). Indeed, in this viewpoint, the resulting oversimplification explains the very attractiveness of the approach, as it edits out politically-difficult questions of power, distribution and class.

This paper considers the debates around the extension of microeconomic methodology to the issue of HIV transmission. Understanding the factors driving HIV incidence holds out the potential of reducing HIV prevalence and this is an area that is now subject to the powerful claims of economic theory. Certainly, the availability of new data has been one of the drivers of the increased profile of microeconomic approaches, but it is also clear that the microeconomic approach has strong resonance with the dominant public health approach to HIV/AIDS. A focus on individual behaviour as being both the cause of high prevalence as well as a means to prevent transmission (through a change in that behaviour) has allowed microeconomic approaches with their focus on individual choice to flourish.

The paper will set out these approaches and consider how useful they are. Certainly, after the first emergence of this literature, there has already been a useful critique of rational choice models of sexual decision-making (for a discussion, see O'Laughlin 2006:10). However, newer versions of rational choice models are more ambitious both in their claims and in their supporting evidence, and this article attempts to develop further the earlier criticisms. It suggests that there are two kinds of short-coming. First, these new models do not hold up to empirical scrutiny. Second, their premises are fundamentally faulty – and this is because of their reliance on methodological individualism and rational choice.

THE EARLY RISE AND FALL OF MODELS OF INDIVIDUAL BEHAVIOUR

The micro-economic approach to HIV transmission was born into a world increasingly dissatisfied with other economic approaches. A slightly older approach, focused on the way prevalence is affected by macro-level social and economic factors, was proving disappointing both in terms of its predictive ability and its analytical approach. For example, studies like the World Bank (1997) report, *Confronting Aids*, suggested a clear relationship between HIV prevalence, poverty and inequality. However, the real world was far messier. For example,

rather than the negative association between national income and HIV prevalence rates often predicted by such work (World Bank, 1997: 28), there appeared to be a positive association within sub-Saharan Africa, with the highest prevalence rates occurring in those countries with the highest regional income per capita: such as South Africa, Botswana and Namibia. In recent work, Nattrass has carried out multiple regression analysis using a dummy variable for being a Southern African country and found that HIV prevalence is 8.3 times higher for countries in Southern Africa given levels of income per capita, nutrition and gender inequality in labour force participation (Nattrass, 2009).

Macro-models were rendered even less convincing by the fact that they failed to set out or prove the micro-causal mechanism that might link macro-economic determinants with HIV transmission. The exact mechanisms by which, for example, poverty leads to behaviours that increase HIV risk, and hence prevalence levels, is rarely spelt out and is seen as universal – e.g. with the same relationship between poverty and HIV prevalence everywhere. As a result there was some analytical disjuncture between these macro-scale models and the dominant public health approaches, which focus predominantly on individual behaviour change (Katz, 2009).[1]

At the same time, the development of new datasets linking HIV status to a range of individual characteristics (such as educational attainment, socio-economic status and self-reported sexual practices) encouraged the development of models that link HIV prevalence to individual rather than macro factors. These approaches have been based on models of individual behaviour with roots in microeconomic consumer theory, and these have become complementary to a public health perspective that focuses on sexual decision-making. As O'Laughlin (2006:3) notes, '[t]he dominant epidemiological model for AIDS prevention has focussed on exposure to the HIV virus, conceived as a moment of individual choice'.[2] O'Laughlin (2006:3-4) argues that the epidemiological model has implicit sociological assumptions regarding the way a rational individual should act when faced with the risk of

1 Katz (2009) argues that the public health perspective on HIV is quite different to that for other infectious diseases, which instead are often far more concerned with population-wide vulnerabilities.

2 Indeed, this seemly 'liberal' basis allows AIDS stigma to continue to flourish. Those living with AIDS can be seen as having made wrong choices, choices that may be at the boundaries or outside social norms. See O'Laughlin (2006) for a fuller discussion of liberal discourse in AIDS prevention.

HIV exposure. Thus, the micro-economic model discussed here put flesh on the bones of this imagined person, by explicitly modelling the choices made by a rational individual.

One of the earliest, and possibly most influential, examples of this application of microeconomic theory to HIV is the model developed by Philipson and Posner (1995). They assess the way individuals develop an 'optimal' level of exposure to HIV based on the cost of condoms, knowledge of transmissions mechanisms and the likely impact on their life expectancy. Individuals use these factors, they argue, to determine whether or not they should engage in risky sex. The 'shadow price' of unsafe sex is the impact on life expectancy and this increases with HIV prevalence. Philipson and Posner suggest that sexually-active individuals who believe themselves to be HIV-negative will take steps (such as using condoms) to lower risk. However, some non-zero level of HIV prevalence may be 'optimal' for a country as a whole, given, for example, the cost of condoms and poor knowledge about transmission. The policy conclusion is an expansion of public AIDS education, condom subsidies and general education improvements (as Philipson and Posner argue that more educated individuals find it easier to assimilate health messages).

Gaffeo's (2003) model of HIV transmission considers the nature of the externalities (in terms of the acquisition of HIV by a wife when a man has unsafe sex with a girlfriend) in a situation where there is asymmetry in information. The starting point for Gaffeo is that consensual sex can be seen as a mutually beneficial exchange, but with a risk of HIV infection. Gaffeo shows that, in the world of the model, it would be possible for a wife to offer an inducement to the husband to encourage him to always use condoms in extra-marital encounters. However, in the real world, he recognises that this is often not feasible. First, it is difficult for wives to monitor their husband's condom use in extra-marital sex. Second, it is also difficult for wives to extract a penalty, such as divorce, in many societies. For Gaffeo then, this leads to the situation where safe sex is 'under-provided by the private market' (30), leaving plenty of scope for public intervention. Rather than general education, Gaffeo argues that there should be a focus on education that challenges social norms 'aimed, for instance, at reducing male psychological resistance to condom use, thus modifying the elasticity of substitution between safe and unsafe sexual consumption' (31).

A shared feature of the approaches taken by Gaffeo and Philipson and Posner is the utilisation of a standard microeconomic approach to decisions about risky sex. Thus, the focus of these models is a representative individual, who makes rational choices between the

benefits and costs of two clearly identified options (safe sex v. risky sex) to maximise utility. This assertion that choice-theoretical models have a role to play in understanding HIV incidence has of course been the source of some debate both within academia but perhaps more clearly in the world of practice and activism. At the heart of this has been a strong opposition to treating sexual interactions as though they were the result of free, informed decisions. Feminist economists, such as Christensen (1998), have pointed out, this rests upon 'strong assumptions regarding the availability of information, the partners' egotism, the absence of extra-economic coercion, and the ability of all parties to exit the market' (1). Thus, political, social, and cultural inequalities that affect 'negotiations' over safe sex are ignored. A particular gender-based critique has emerged that sees women as being constrained in making decisions over sex by gender-based social norms and practices. This is best exemplified by a quote from a UNAIDS publication that explains the inadequacies of the standard ABC approach (practice Abstinence, Be faithful, use Condoms): 'abstinence is meaningless to girls and women who are coerced or forced into sexual activity. Faithfulness offers little protection to wives whose husbands have several partners or were infected before they were married. Condoms require the cooperation of men, who may refuse to use them' (UNAIDS, UNFPA & UNIFEM, 2004: 16).[3] In many formulations of this argument, women are seen as having no choice over sex and indeed, in sub-Saharan Africa in particular, male behaviour has been seen as the cause of the HIV pandemic.[4] In a debate focused around coercion and powerlessness, the future seemed bleak for models of choice.

A REASSERTION OF CHOICE IN HIV

Choice-based analysis has since reasserted itself in the debate about HIV prevalence for two quite different reasons. Epidemiological studies have yielded mounting evidence that appears to overturn a simplistic view of male sexual behaviour as the sole cause of infection. De Walque (2007) investigates data from five DHS surveys, while Beegle & De Walque (2009)

3 The focus on choice has also been criticised by those writing more generally about the role that forced sexual activity has in HIV-transmission, see Andersson (2006).

4 This apolitical gender debate, what Katz (2009) calls 'neo-liberal pseudo-feminism' ignores the wider economic and social relations that lead to gendered inequality. Rather than pathologizing African masculinity, O'Laughlin (2008) has argued that we should better understand how male sexual behaviour is created and embedded within particular economic and social situations. For a discussion of the history of male violence against women in South Africa, see Marks (2008: 45-48).

extend the analysis to include fourteen countries. Instead they argue that the data shows that 'women are almost as likely to transmit the infection to their uninfected partners as men are' (94). In nine out of the fourteen countries studied, less than one third of the couples affected by HIV were concordant positive. At the same time, the fraction of HIV-affected couples in which only the females are positive exceeds 30 per cent in Burkina Faso, Cote D'Ivoire, Cameroon, Ethiopia, Ghana, Guinea, Kenya, Niger and Tanzania (Beegle & De Walque, 2009: table 4). While De Walque (2007) and Beegle & De Walque (2009) explore alternative explanations for this (such as bias in HIV testing or infection prior to the present union), they do not find that the possibilities can explain the majority of the cases. Linking the lack of attention to female extra-marital sexuality with the lack of prevention efforts in this area, they conclude that 'ignoring the role female sexual activity outside the union plays in the transmission of the epidemic would be a disservice to women' (Beegle & De Walque, 2009: 98). They argue that the data rejects the 'pervasive, if unstated, belief …that males are by and large responsible for spreading the infection among married and cohabiting couples' (94).

At the same time as new data emerged that seemed to show that women were not always as sexually-passive as a naive gender-based argument may portray, the emergence of new data sets also simulated a range of work seeking to show that microeconomic models were useful – i.e. that models of choice did have a role to play, and that people, and women in particular, were not passive in the face of the HIV pandemic and could and did make active choices about their sexual behaviour. Two of the leading examples are found in work by Emily Oster of the University of Chicago (2007) and work by Nancy Luke of Brown University (2006).

Oster (2007) uses DHS data from nine African countries to investigate the factors that determine individual behaviour in a climate of HIV-risk.[5] She specifically looks at whether individuals adopt less risky sexual behaviour in the light of longer non-HIV life expectancy (i.e. that the people who change their behaviour the most will be those who have more future years of life to lose from HIV infection). Her model is based on the assumption that individual behaviour is 'consistent with utility-maximizing choices in the face of HIV' (2007: 2). The data, taken from surveys carried out between 1999 and 2003 appear to support her hypothesis. While she finds relatively limited behavioural responses overall in response to the existence of HIV (in terms of changing sexual activity towards having fewer sexual

5 The countries are Benin, Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Namibia and Zimbabwe.

partners in the previous year), this response is larger for those who have higher non-HIV life expectancy and who are richer (2007: 29). In her view, the results suggest several things. They may help explain the apparent lack of behavioural response among African populations in the face of HIV risk.[6] The policy conclusion is that people with a higher future value of life will adopt more healthy behaviours – and would imply that investments in dealing with malaria and maternal mortality, for example, would also reduce HIV incidence. Moreover, she argues that this behaviour may be seen across a range of areas, for example in the use of bed nets in African countries and the use of seatbelts in the US. As a result, she argues that her framework of analysis may help us understand other health behaviours (2007: 29). Oster therefore constructs a seemingly strong case for the usefulness of models based on the micro-foundations of a utility-maximising individual making choices about behaviour.

The World Bank-sponsored work by Nancy Luke (2006) speaks directly to this debate about individual-level decision-making, utilising a microeconomic model of behaviour to show that women do indeed make clear choices over sex. At the heart of the paper is a survey of a randomly-selected sample of 1,028 men aged 21-45 in the Kenyan town of Kisumu who reported having non-marital, non-commercial sexual partners (i.e. not wives or sex-workers). Luke then focuses on the determinants of risky sex between these men and their girlfriends. She argues that there is a clear relationship between condom use and transfers (or gifts) from a man to a woman, such that the greater the value of the transfers, the more likely that there will be unprotected sex. This research seeks to restore power to the micro-modelling approach and to policy-makers focused on individual decision-makers. Luke asserts strongly that her results show that women are not passive victims of male decisions but instead are making 'conscious trade-offs between the risks and the benefits of informal exchange relationships' (345). She finds that a small change in transfers from men to women gives rise to a substantial decrease in condom use, with the policy conclusion being that improvements in the economic opportunities for women could change 'the terms of trade in the sexual marketplace significantly' (345). A secondary finding concerns the protective impact of male

6 Oster (2007: 1-2) quotes a range of studies that argue that there has been limited response to HIV risk among African populations at the time of writing, which she contrasts to extensive behavioural response among high risk groups, especially gay men, in the United States. In this it is important to keep in mind the arguments made by Bennell (2003)for the same period of time, which suggest that the apparent lack of behavioural response in that period results from a very particular reading of HIV prevalence data. Investigating UNAIDS data again, Bennell (2003) shows that there is more substantial evidence for behavioural change in many African countries.

education, as with every year of education, men are 3.5 per cent more likely to use a condom (338). Luke's work appears then to be a convincing reassertion of the usefulness of individual-level behavioural modelling. Women are recast as individuals who actively choose their risk-exposure, while more educated men appear to choose less risky behaviour.

QUESTIONING THE BASIS FOR CHOICE-THEORETIC MODELS

While the work of Oster and Luke appears to convincingly reassert the usefulness of individual-level behavioural modelling by showing that it accords with empirical patterns, both are vulnerable to serious criticisms. I will argue below that it is not clear that this work does indeed explain the observed facts. Further, I suggest that this may be due to the inappropriateness of the choice-theoretic approach both in its focus on the representative individual and its assumptions about the way sexual-decisions are made.

Lies, Damned Lies and Self-Reported Behaviour

On the ability to explain the empirical evidence, both studies face the problem that they use data on self-reported behaviour. Studying data for a number of African countries, de Walque (2007), a researcher based at the World Bank, finds a number of anomalies and concludes that self-reports of sexual behaviour are unreliable and that both research and policy should 'avoid relying exclusively on self-reported behaviour' (519). Specifically, De Walque (2007: 518) highlights the gendered bias in reporting of sexual activity, with evidence that women are systematically likely to under-report sexual activity and the number of sexual partners. More damaging still for both Oster and Luke's analysis (and their conclusions about the protecting-effects of education or wealth) is Bujra's (2006) class-based analysis of self-reported data in Tanzania. She analysed the 2003-04 Tanzanian HIV/AIDS Indicator Survey and compared prevalence data with the responses to behavioural questions. She found that, the higher the wealth quintile (and hence, the higher the educational level), the more likely respondents would be to report few sexual partners and high use of condoms in risky sexual encounters (122). However, these results were at odds with the far higher prevalence rates found among higher wealth quintiles in the 2003-04 survey (of which, more below), and

Bujra suggests that the self-reported behaviour of richer or more educated individuals should not be taken entirely at face value as 'such respondents would have been more likely to know what answers were expected and more articulate in asserting their moral standing' (122).

If self-reported data is inherently unreliable, it is important to ask the question whether either Luke or Oster's work can explain the patterns drawn from more reliable data sources, namely data on HIV prevalence.[7] Mishra et al (2007) review data from recent population-based, nationally representative surveys with HIV testing in sub-Saharan Africa. Using data for Kenya, Ghana, Burkina Faso, Cameroon, Tanzania, Lesotho, Malawi, and Uganda, they find that, in all eight countries, wealthier men and women tend to have higher prevalence of HIV than poorer ones. For women, there is a clear linear relationship between wealth and HIV-prevalence in all countries. However, for men, this clear linear relationship held in all countries except in Lesotho and Ghana, where there was an inverted-U relationship (i.e. those men in the middle wealth groups had the highest prevalence) (Mishra et al, 2007). They investigate the extent to which this relationship is generated by the fact that wealthier men and women tend to be more mobile and to live in urban areas where HIV is often more prevalent. However, even when accounting for these other factors, they still find that wealthier people are at least as likely as poor people to be HIV positive (S21-S25). They conclude that '[t]he positive association between wealth and HIV prevalence is only partly explained by an association of wealth with other underlying factors, such as place of residence' (S17). Parkhurst (2010) updates the Mishra et al analysis, investigating data for four more countries in addition to the studies included in the Mishra et al work. He finds that the positive association between wealth and HIV prevalence exists only for poorer African countries (520). For richer countries (defined by Parkhurst as those with a GDP per capita higher than US$2,000) 'there was no consistent increase in prevalence with wealth quintile' (521).

7 To look at the relationship between individual characteristics and HIV status, one would ideally have measures of HIV incidence, which would show the characteristics of individuals who had become HIV positive in any one period. However, without such data, the debate is forced to use prevalence data, which records the 'stock' of HIV prevalence in a country at a single point in time. At the same time, prevalence may not be a good proxy for incidence, especially if the availability of antiretroviral therapy (ART) is biased towards particular groups (i.e. wealthier or urban workers) (Beegle & de Walque 2009: 98). Thus, richer HIV+ individuals may live longer – although to complicate matters, their HIV status may impoverish them.

The factors that may lead to this complex pattern of prevalence (i.e. a positive association between wealth and prevalence in some settings but not in others) have been further investigated by Bujra (2006) for the data on Tanzania. Looking at data from the 2003-04 Tanzanian HIV/AIDS Indicator Survey, which shows that for both men and women, HIV prevalence increases both with wealth and education (see DHS (2005) for more detail[8]). Bujra's (2006) analysis suggests that this pattern of prevalence reflects underlying class dynamics and specific patterns of sexual networking associated with each class. She sees the greater wealth of educated elites, in particular, the freedom of elite men from traditional social constraints, as allowing greater sexual networking and mobility in Tanzania. As a result they have a higher risk of HIV. At the same time, she points to the 'chilling' evidence on the high HIV prevalence rates of elite women (2006: 122). She argues that this shows the situation of young women who 'are struggling to find acceptable outlets for their sexuality in situations of relative freedom' (ibid). As Parkhurst (2010) concludes '[b]eing poor or being wealthy may be associated with sets of behaviours that are either protective or risky for HIV infection' (524). In some cases, Parkhurst argues, poor people may undertake particularly risky practices, such as earlier sexual debut or reliance on income from transactional sex, whereas wealthy individuals may engage in other risky sexual practices, such as having higher numbers of voluntary regular partners.

How does this more reliable evidence fit with the prediction of the microeconomic models above? Luke's model would suggest that higher female income would always reduce risky behaviour and hence HIV risk for women, as they are seen as being more able to enforce their desire for safe sex with more income. However, this conclusion is not supported by the findings of the studies above, nor by a systematic review of 35 or so studies which finds mixed evidence on the link between female socio-economic status and HIV infection (Wojcicki, 2005). Wojcicki finds slightly more evidence showing that women with higher socio-economic status are more likely to be infected and suggests that 'there is some indication that access to increased funds for women may put them at increased risk for HIV infection - potentially by giving them access to more partners or opportunities for travel'

8 For both men and women, HIV prevalence increased with education. Adults with secondary or higher education were almost 50 per cent more likely to be infected with HIV than those with no education. HIV prevalence also increased with wealth, with infection rates three times higher among those in the highest wealth quintile than those in the lowest wealth quintile. However, see later in text for discussion by Parkhurst (2011).

(19). At issue then is the simplistic relationship drawn by Luke between poverty and HIV risk for women.

It is also clear that Luke's conclusions about the protective effect of male education have mixed empirical backing. Investigating ten DHS surveys carried out in the early to mid-2000s from Sub-Saharan African countries, Wotton (2010) finds that in Ethiopia, Malawi, Rwanda, Burkina Faso and Cameroon there was a clear positive association between education and HIV prevalence. In Kenya and Ghana, there was something of an inverted-U relation, with HIV prevalence rates peaking for those with some years of primary education before falling for those with secondary education. Only for Lesotho, Zimbabwe and Benin, did Wotton find a negative association between education and HIV prevalence in the DHS data.

What of Oster's predictions about behaviour change, that people with a higher future value of life will adopt more healthy behaviours? There is no evidence linking life expectancy to changes in either HIV prevalence or incidence – i.e. there is, at the time of writing, no dynamic longitudinal data on this issue. However, it is clear that the static picture of HIV prevalence gained by a simple comparison of adult prevalence and life expectancy is not supportive. UNAIDS data shows that the African sub-region with the highest adult HIV prevalence, Southern Africa, had far higher life expectancy than other African sub-regions prior to the mortality impact of AIDS. UNAIDS (2008: table 2.11) shows that, over the period 1990-1995, life expectancy at birth in Southern African peaked at over 60 years. At the same time, life expectancy in East, West and Central Africa was no more than 50 years. The extremely high prevalence rates in Southern Africa have since had a huge impact on life expectancy, reversing the developmental gains of many decades and bringing life expectancy back below 50 years.

However, it is fair to note that this does not itself overturn Oster's predictions about behaviour as it could be argued that these high impacts occurred at a stage when the risks of HIV transmission where not widely known and so we would not expect to have seen the kind of behavioural change she predicts. Without longitudinal data linking HIV prevalence to life expectancy over time in different countries or, preferably, different groups within any one country, it is hard to draw firm conclusions. More promisingly for Oster, there may be some limited evidence on education's protective effects in terms of HIV risk. Parkhurst (2010: 523) points to one systematic review that found that the correlation between prevalence and

education reversed as the HIV epidemic matured, and that education became more protective with time. However, Parkhurst does not draw the conclusion that education is always protective, instead pointing to the fact that in some settings there is clearly a positive correlation between education and HIV prevalence. His alternative conclusion is that the dynamics between HIV risk and socio-economic variables can change over time, cautioning against simplistic assessments of the drivers of HIV risk and arguing that 'we need first to identify the causal mechanisms that lead specific factors to translate into the risk of HIV infection in different social contexts' (524).

Consumer Theory and Methodological Individualism – an Unsound Premise?

The results of data that incorporate HIV-tests suggest serious empirical challenge to the predictions of this new breed of micro-focused approach. The models do not seem to be able to explain the data based on patterns in HIV prevalence. This may be due to the fact that they are fundamentally applications of a standard microeconomic model of consumer choice.[9] Consumer theory is based around the analysis of the choices of a rational and representative consumer, who attempts to maximise his/her utility. As such, it promises to help us understand why an individual chooses certain states over others (e.g. risky sex over safe sex). The decisions of the representative individual are then aggregated up to explain outcomes at the level of the society (Fine & Milonakis 2009: 3).

However, this involves several reductionisms. The first is the use of a representative agent, whose decisions can then be aggregated to explain social outcomes overall. This is problematic in two senses in the area of HIV prevalence. Firstly, it is problematic to analyse sexual decisions of an individual abstracted from the wider sexual activity in which it is embedded (or to use an epidemiologist's term, from wider 'sexual networks'). To be clearer, epidemiologists, such as Wellings et al (2006: 1714) and Epstein (2007: 49-85), suggest that a prime cause of the high prevalence rates in many African countries is the relatively widespread nature of concurrent (i.e. overlapping) sexual relationships rather than the

9 Lazear (2000) notes that consumer theory has been a key way in which economics has expanded to consider areas that were previously the domain of other disciplines. For example, it has been applied to issues of religion, the care of family members, discrimination and demography.

absolute number of sexual partners.[10] However, these are difficult to analyse using static data collected at the individual level, as the issue is not so much the number of sexual partners but the nature of the relationship in terms of its permanency and overlap with others.[11] This debate has called into question the adequacy of the categories and methodology used at present, as it is not clear how well the dynamics of 'sexual networks' can be captured by standard empirical approaches focusing solely on snapshots of individual behaviour.[12] At issue is the fact that concurrency is hard to capture in the standard approach of asking individuals about the number of their partners in any one time period, without knowing if they are long-term and overlapping. And of course, individuals may not always be aware of the latter issue, i.e. if their partner(s) themselves have other partners.[13]

So one difficulty is that the focus on individuals makes a discussion of networks problematic. More than that, the issue of a 'representative individual' is also problematic. For example, Luke (2006) models a homogenous man and a homogenous woman, while Oster (2007) solely models a representative individual making choices over sexual partners (although she does run the data for men and women separately in order to see if the size of the parameters on key variables differ). However, the discussion above on the relationship between wealth, education and HIV prevalence clearly suggests that quite different social norms may exist for

10 Along with many other authors, Stillwaggon (2008) challenges common notions of an exceptional African sexuality by reminding readers that studies find that the average number of lifetime partners is far greater in North America and Europe than in African countries. At the same time the age of sexual debut is far lower in the US and UK than in the African countries for which data exist (2008:73).

11 So to be clear, it is not so much the number of sexual partners in any time period that matters but whether such partnerships occur at the same time and have a long-term character. Such long-run overlapping partnerships appear to promote the spread of HIV in two inter-connected ways. First, they facilitate sexual contact with others soon after an individual has contracted the HIV virus from another person and, hence, at a time when the virus is at its most infective. At the same time, and importantly, condom use is far less common among long-term partners than among casual partners, and so long-term concurrent partnerships will be more risky than high numbers of serial partnerships.

12 For example, Lagarde et al (2001) studied the link between concurrent sexual activity and HIV prevalence in five African cities and did not find a clear relationship between the two. In a related study of four African cities, UNAIDS (1999), no relationship could be found between HIV prevalence and concurrent sexual partnerships. Epstein (2007) argues that this is due to the inadequacies of data collection for an analysis of concurrency.

13 For example, an individual may report having a single partner to which s/he was faithful during the reference period, but this in itself does not illustrate risk levels if we do not know the sexual networks of that partner. If their partner has a number of other concurrent partners, then the risk of exposure to HIV may be high.

different groups within any one country. There are not only gender-based but also class-based social norms, suggesting Luke and Oster might need to model several different 'representative agents' in order to capture the way that important differences between different groups result in an overall pattern of prevalence.

Rational Choice and Sexual Decision-making

However, this would only be a partial solution to the problems of the application of the consumer choice approach to HIV prevalence. Other problems remain, not least the fact that the models are set up with only limited reference to the broader social context and more specifically the way that social norms over sexual behaviour are established. These social norms are given only cursory treatment in both models, but it is clearly essential to policy makers and others to understand why certain patterns of sexual behaviour emerge. For example, a number of authors from other disciplines have pointed to the predominance of male migrancy in explaining concurrency in some contexts (e.g. Marks, 2007; Katz, 2009), while others have pointed to the delays resulting from inadequate transport infrastructure and border red-tape to explain commercial sexual transactions (e.g. Stillwaggon, 2006). By isolating behaviour from the social norms that affect it, authors such as Oster and Luke are therefore treating these norms as exogenous, when in practice they are dynamic and reflect wider social and economic changes.

In this way, the work by Oster and Luke also loses any sense of context or historical specificity. However, these factors are crucial in explaining why individuals behave the way they do, as we can see if we look more deeply at the assumptions made about individual choice in the Oster and Luke models.[14] So far, we have seen that the models, as argued more generally by Fine & Milonakis (2009), are based on ahistoric homogenous agents (at best differentiated by gender) whose decisions can be aggregated to explain overall outcomes with no need for reference to any other characteristic of society. However, these models then go

14 Consumer choice theory has also been challenged on its 'home' ground – i.e. in terms of its analysis of the choices of consumers in the economic markets of the developed countries. Batat (2011) reviews a range of new approaches that arise from post modernism and marketing. These present a challenge for standard consumer choice theory, as they present a picture of a consumer who 'actively, consumes, creating value and whose consumption preferences are created by all the dimensions of his consumption' such as ideological, social, cultural, symbolic and experiential factors (Batat, 2011: 2).

on to make very particular assumptions about the way in which decisions are made. First, the models assume that individuals make independent decisions over clear, isolated states. The limitations of this can clearly be seen if we consider the Luke model. Is it really possible to isolate decisions over condom use from other factors? For example, women not only run the risk of HIV if they have sex without condoms, they also risk pregnancy, which some may actively desire, or they may be signalling trust in their partner. What is the 'decision' that these women are making? To understand this, we might instead want to know more about the role of condom use in different kinds of sexual relationship, where non-use of condoms may also be related to desires for pregnancy and signalling of trust. This would put far more emphasis on questions such as the duration of the relationship and its character, than the blanket categorisation of an 'informal sexual relationship' employed by Luke.[15]

Cultural or ethical values are stripped from sexual decisions in both models. 'Such rationality ... reduces economic behaviour to a question of individual *choice* … with little or no regard to the processes and experiences attached to such choices [original emphasis]' (Fine and Milonakis, 2009: 20). Crucially, for this discussion are the perceptions of what is or is not risky behaviour in terms of HIV. Like a number of authors, Marks (2007) has made the point that a deep-seated suspicion of the discourses of western medicine has skewed perceptions of medical information in South Africa. This has been most evident in terms of a critical viewpoint on antiretrovirals but also exists in terms of the perception of information regarding risky behaviour in South Africa.

Thus, the models by Luke and Oster are silent on the actual options that individuals face and the way in which these coincide with their interpretation of medical evidence on HIV transmission. We are also left wondering about the use of the term 'choice' in the debates above. In the model, individuals have choice in the sense that they are able to exercise their

15 Wamoyi et al (2011) describe the complex sexual norms that govern transactional sex in Tanzania. Importantly, while the young women involved in such relationships in this study saw themselves as exhibiting decision-making power over the bodies, Wamoyi et al show that this power is rather limited. 'As much as women initially choose their sexual partners and sometimes dictate the value of the exchange, after one or several sexual encounters the men took over: they decided on issues such as the use of condoms and contraception, the value of the exchange, and when to practice exchange' (Wamoyi et al 2011:11). Furthermore, it was clear that some of these young girls also experienced violence and coercion.

opinions, to engage in an activity or to reject an activity.[16] Indeed this version of choice is of paramount importance to the models, and it is worth spending a little time to see why. In the Oster model, for example, she assumes that the relationship between the two variables (the number of sexual partners and the background HIV rate) expresses the exact value individuals place on non-HIV life expectancy. Thus, the greater the decrease in the number of sexual partners, other things being equal, this would reflect a greater value to non-HIV life expectancy. If decrease in sexual partners is smaller (or the number stagnates or rises), other things being equal, this would reflect a lower value to non-HIV life expectancy. Thus, for Oster and others modelling in the same way, changes in sexual behaviour are thought to uncover individual preferences because it is assumed that trends in sexual behaviour reflect those preferences. This can only happen if we assume that individuals have 'choice' in the sense spelled out above – that they are able to freely engage or disengage in certain kinds of sexual behaviour. If this is not true, then the statistical relationship that arises is not a measure of preference but of something else.[17]

To return to the role of rape and violent sexual coercion, there has been fresh interest at the international level in assessing the scope of such violence. There are a growing number of studies of the prevalence of intimate partner violence, with data now existing for 90 countries worldwide, although it is not always comparable (Garcia-Moreno and Watts, 2011). These suggest that the experience of sexual violence is widespread if uneven. Studies carried out in 10 countries by WHO found that sexual violence by a partner at some point in life up to 49 years of age was reported by 6–59% of interviewees (WHO, 2010: 12), while sexual violence by a non-partner any time after 15 and up to 49 years of age was reported by 0.3–11.5% of interviewees (WHO, 2010: 13).[18] Three of the countries studied, in sub-Saharan Africa, are in areas of higher HIV prevalence, and so are highly relevant to this discussion. The studies found rates of ever experiencing sexual violence were 59%, 17% and up to 31% for sites in Ethiopia, Namibia and Tanzania respectively (WHO 2010: 13, Table 1). Watts and

[16] In general theoretical terms, consumers are seen deciding freely whether or not consumer a good.

[17] Of course, this problem of interpretation is compounded by the other methodological shortcomings raised in this section.

[18] The WHO work has focused on violence against women, especially intimate partner violence and was carried out in the following countries in order to represent diverse cultural, geographical and urban/rural settings: Bangladesh, Brazil, Ethiopia, Japan, Peru, Namibia, Samoa, Serbia and Montenegro, Thailand, and the United Republic of Tanzania.

Zimmerman (2002:1233) report on a cross-sectional household survey in one province in Zimbabwe, where 26% of women who had ever been married reported being forced to have sex when they did not want to. When asked about the type of force used, 23% reported physical force, 20% reported that their partner shouted, 12% reported being forced while they were asleep, and 6% reported the use of threats (1233). Further evidence is available about coercion from studies of the extent to which women report that their first sexual experience was not consensual: again picking out those countries in areas of higher HIV prevalence, we find that this is reported by 28% of women in Tanzania and 40% of women in South Africa (Watts and Zimmerman 2002: 1235). Mass rape has been reported in a number of sub-Saharan countries during conflict, such as Democratic Republic of Congo, Liberia, Rwanda and Uganda, although there is little firm evidence to quantify the extent.

However, it should be noted that the relationship between violent sexual coercion and HIV risk is complicated, being highly contingent on the setting in which occurs. For example, evidence from South Africa indicates that men who perpetrate violence are more likely to be infected with HIV (WHO 2010: 19), and this supports other studies that find women who experience domestic violence by their partners have a 50 percent increased risk of contracting HIV in parts of South Africa (Dunkle et al, 2004). At the same time, there is an ongoing debate about the extent to which civil conflict and war raise HIV risk. A 2007 UNHCR study found that data from seven conflict-affected African countries did not show an increase in prevalence of HIV infection during periods of conflict, irrespective of prevalence when conflict began (Spiegel et al. 2007). HIV prevalence data within conflict zones were obtained from epidemiological surveys of persons living in the Democratic Republic of Congo (DRC), southern Sudan, Rwanda, Uganda, Sierra Leone, Somalia, and Burundi. Prevalence in urban areas affected by conflict decreased in Burundi, Rwanda, and Uganda at similar rates to urban areas unaffected by conflict in their respective countries. Prevalence in conflict-affected rural areas remained low and fairly stable in these countries. Of the 12 sets of refugee camps surveyed, nine had a lower prevalence of HIV infection, two a similar prevalence, and one a higher prevalence than their respective host communities. Despite mass rape in these conflict-affected countries, the data did not show that rape increased prevalence of HIV infection at the population level. Spiegel et al (2007:2193-4) conclude that existing data do not validate the argument that conflict and displacement raise HIV prevalence. However, they recognise that there are considerable data limitations, not least in assessing the impact of widespread

rape.[19] As a result they suggest that '[a]lthough some conclusions from the seven African countries studied here might apply to other countries affected by conflict, every situation is unique and should be examined according to context. Generalisations should be avoided.' (Spiegel et al 2007: 2194).

Again, we are reminded of Parkhurst's (2010) earlier conclusion of the importance of setting, and of course the general exhortation by UNAIDS that researchers and practitioners should 'know your epidemic'.[20] However, more than that, the discussion in the paragraph above, casts doubt on the generalised applicability of models of choice, in the light of the wide degree of violent coercion experienced by women in areas of high HIV prevalence. This replicates the earlier criticisms of models of choice reported above. In the same way, however, the rejoinder from some commentators might be that violent sexual coercion, as abhorrent as it is, has not been experienced by all women at all times in HIV-affected areas. Surely models of choice must be applicable to them?

Indeed, Luke's work focuses entirely on the use of condoms in consensual sexual relationships, and it might be assumed that a choice-theoretic approach is appropriate in such settings. However, Luke's study also suggests large differences in bargaining power between men and women in her survey area, with women being far poorer and lacking income-earning opportunities. She recognises that sexual relationships and financial support are intertwined, with some women becoming dependent on boyfriends for the most basic of their own financial requirements. However, what Luke does not see is that this recognition begins to erode the very concept of 'choice' that the consumer model is based on. Where there are asymmetries of economic and social power, with some women being dependent on boyfriends and husband for both financial and social standing, can these women be seen as making fully-informed, independent, free choices? Shula Marks (2007: 867) suggests that many young South African women are 'choice-disabled', being dependent to a large extent on men for economic support and status, and thus engaging in risky sexual behaviour to secure their attentions and fatalistically accepting the concomitant risk of HIV and sexual

19 Entering into this debate, Supervie et al (2010) use a mathematical model to argue that while the prevalence of HIV may stay the same during conflict situations, the annual incidence of HIV could increase by approximately 6-7 percent due to mass rape.

20 http://hivpreventiontoolkit.unaids.org/Knowledge_Epidemic.aspx

violence as a necessary part of survival.[21] In recognition of the interlinkages of sex, money and social standing, we may then want to think not about sexual *choices*, with all of the concomitant understandings of what that means, but rather about *options* available to particular types of people. These options may be extremely narrow for some, especially for poor women in certain areas, who may not always face violent compulsion to engage in sexual relationships, but whose degree of 'choice' is severely limited. Rather than the textbook image of a individual freely making choices, we might instead envisage a spectrum of narrowed options, with violence at one end.

Finally, it has been self-evident that these models of individual decision-making focus on risky sex between individuals as the key factor in driving HIV prevalence. However, this ignores many structural features that other writers have identified as being important drivers of HIV risk.[22] Luke's model consequently focuses on the demand for condom use, rather than the price or availability of condoms themselves, something that others have been concerned about (Wellings et al, 2006: 1723). In addition, other studies have identified structural factors as increasing the risk of HIV acquisition. A UNAIDS (1999) study of four African cities found a link between HIV prevalence and two factors likely to increase HIV transmission during sexual contact: presence of untreated sexually transmitted infections (STIs)[23] and low levels of male circumcision. These factors clearly affected the infectivity of HIV for any given sexual act, making transmission much easier. However, they are also factors that are determined by socio-cultural attitudes (both towards male circumcision and the take up of STI treatment) and the cost and availability of public health services. More specifically, the nature of the public health system will determine, for example, access to condoms and the extent of untreated STIs. Socio-cultural attitudes by different classes will affect the degree of male circumcision and shape sexual networks. The nature of social change, mobility and labour migration will also impact on patterns of sexual networking and

21 This concern about the degree to which individuals can be thought to 'choose' in a environments of extremely inequality or indeed with the threat of violence has echoes in other critiques of mainstream economic theory. For example, one critique of either unitary or cooperative household bargaining models is that their model of bargaining cannot account for violence and compulsion within the household (Johnston & Le Roux, 2007: 362-3).

22 Blood transfusions and mother-to-child transmission could also be added to the list in the text.

23 The presence of an STI can increase both the acquisition and transmission of HIV ten-fold (WHO 2007).

affect the acceptability of particular practices, as well as link up areas with different background prevalence (i.e. can link up areas of lower prevalence with those of higher prevalence) (Deane et al 2010). Clearly both Oster's and Luke's model exclude the wider social and economic factors of relevance.

The Latest Generation of Choice-Theoretic Models – Bad Science?

Thus, these models of individual choice fail to explain empirical patterns in HIV prevalence and have serious methodological weaknesses. They exclude relevant structural factors, make the unrealistic assumption of a representative individual (or at best a representative man and a representative woman), consider sexual behaviour out of context and, finally, use a concept of choice that fails to take account of the social and economic inequalities that exist in many settings. As such, it is unsurprising that these models struggle to explain the empirical evidence. They are also likely then to act as poor guides to policy-makers, not least because some of the most important factors (such as the way that social norms about sexual activity change) are exogenous to the models.

CONCLUSION ON THE ROLE OF CHOICE IN HIV-AIDS ANALYSIS

Like many other areas previously the domain of other social sciences, mainstream economics has been applied to HIV transmission. The economics literature increasingly favours a choice-theoretic approach, rather than an older macro-level analysis, which was less than convincing in terms of predictive power or analytical basis. The ground was likely to be particularly fertile for such developments, given that AIDS policy has tended to focus on individual behaviour change (Stillwaggon, 2006; Katz, 2009).

However, these microeconomic approaches are often calibrated using self-reported behavioural data, which is well-known to be subject to error. In the text above, the extent to which two important microeconomic models could explain HIV *prevalence* data was investigated. Neither performed well at explaining this more robust data. It was suggested that these models may not be good predictors of actual prevalence due to a number of shortcomings in their approach.

Importantly, the critique that was set out tried to go further than earlier appraisals of the application of choice theoretic models. These earlier criticisms often focused on the fact that women had little or no decision-making power over sexual behaviour, especially in those regions where HIV is most widespread. As support, commentators pointed to the high levels of rape and other violent sexual coercion experienced by women in parts of sub-Saharan Africa. This paper has tried to put concerns about violent sexual coercion into context. The best available data shows that such coercion is common in those areas affected by high HIV prevalence, although highly uneven. The paper also recognises that many women may not however experience such coercion. In these cases, the economic concept of choice is also likely to be inappropriate, given its stringent requirement on freedom of sexual engagement. In the critique laid out here, we can encompass both the fact of *coercion* for some but also limited *options* for others. These options will be related to both class- and gender-based sexual norms.

Over and above the important critique of the role of choice in microeconomic analyses of HIV prevalence, this paper has also set out a number of other damaging methodological criticisms. The alternative approach suggested here is to focus on the options available to certain men and certain women in particular contexts. This allows for a wider consideration of the factors that affect HIV risk in any one place. In contrast, the choice-theoretic approaches reviewed here appear to have failed to incorporate factors that are important in the writing from other disciplines on prevalence levels. Epidemiologists, gender specialists and political economists, among others, have pointed to a wide range of structural factors that affect HIV risk and subsequent prevalence. This harks back to a general point made by Fine and Milonakis (2009: 19-20), who argue that the treatment of choice and preferences in mainstream economics constrains its ability to 'colonise' other disciplines in ways that are acceptable to their own scholars.

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