Sex Workers and the Cost of Safe Sex:
The Compensating Differential for Condom Use in Calcutta

Vijayendra Rao, Development Research Group, The World Bank
Indrani Gupta, Institute of Economic Growth, Delhi
Michael Lokshin, Development Research Group, The World Bank
Smarajit Jana, All India Institute of Hygeine and Public Health, Calcutta

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Abstract

The practice of safe sex by commercial sex workers is considered to be central in preventing the transmission of AIDS in developing countries. However, anecdotal evidence suggests that sex workers may face large losses in income from using condoms because of a strong preference for condom-free sex among clients. This paper attempts to estimate the compensating differential for condom use among sex workers in Calcutta from a survey conducted in 1993. We follow an instrumental variable approach that relies on the non-systematic placement of sex workers in an intervention program that focussed on providing information on HIV-AIDS and safe sex practices. This allows us to identify the relationship between condom use and the price per sex act by reducing the bias from unobserved heterogeneity which is widespread in estimates of compensating wage differentials. FIML estimates reveal that sex workers who always use condoms face a loss of 44 per cent in their average earnings per act suggesting that there may be strong disincentives that prevent sex workers from practicing safe sex. This could be a major obstacle in preventing the spread of AIDS in parts of the world, like India, where knowledge about safe-sex practices is poor.

JEL Codes: I12 , J44
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1. Introduction

There have been few epidemics in the last century which have affected living standards as severely in the developing world as the HIV-AIDS crisis. Recent UNAIDS/WHO estimates indicate that in 1999 ninety-five per cent of infected individuals lived in developing countries with 5.4 million new infections added every year (UNAIDS 2000). The epidemic is particularly devastating because it strikes the most productive members of the population – young adults. It impoverishes vulnerable households not just by the death of a wage earner, but also by significantly increasing medical and funeral expenditures (World Bank 1997). Depending upon the severity of the epidemic, the death of such large numbers of productive individuals can have severe macroeconomic consequences (Cuddington 1993, Over 1992), and overwhelm health services by crowding out care for other less devastating illnesses (World Bank, 1997).

While the prevalence of HIV-AIDS in Asia is low in comparison to Africa, the sheer size of many Asian countries and the existence of localized epidemics in several sub-regions demonstrate that the focus of new infections is shifting east (Hwang, 2001). The most recent data indicate that about 7 million adults - 7 out of 1,000 - are infected in India compared to 3.7 million infections in South Africa (UNAIDS 2000). As in Africa, over 76 per cent of detected HIV infections in India are caused by heterosexual sex. Epidemiological analyses reveal that HIV has been rapidly spreading from individuals practicing high risk behavior to the general population (NACO 1999), and India's National AIDS Control Organization (NACO) identifies commercial sex workers as one of the most important of these high-risk groups. They act as points of entry for the epidemic into the population by infecting men who then pass on the disease to their wives and other sexual partners. Sex workers in India have a high risk of infection not just because of their large number of sex partners, but also because the high prevalence of other sexually transmitted diseases among them which further increase the risk of HIV transmission. Consequently several HIV-AIDS interventions in India have been targeted at the commercial sex industry (NACO, 1999).

Given that the disease has no effective vaccine or cure, and that sex work plays a central role in its growth, promoting the use of condoms and other safe sex practices among sex workers is considered perhaps the most effective method of preventing the spread of the epidemic (World Bank 1997, Jain et. al., 1994). Condom use not only directly prevents HIV infection, but also protects users from other sexually transmitted diseases which reduces the secondary increase in HIV-risk caused by STDs (World Bank 1997). In India as in many developing countries, however, the propagation of condom use is difficult because men have a strong preference against using them. One indicator of this is that, despite many decades of extensive government sponsored "family planning" campaigns promoting their use, condoms have not become a commonly used method of contraception. Data from a nationally representative sample show,

for instance, that only 7% of married couples use condoms, with female sterilization being the most widely used method of contraception (27 per cent), followed by abstinence and other traditional methods (20 per cent)[1]. This inherent preference against condoms is compounded by a lack of awareness about HIV/AIDS and safe sex practices among sex workers (Bhave et. al. 1995) and in the general population[2].

Consequently sex workers who want to practice safe sex face losing a considerable amount of money by doing so. Bhave et. al. (1995) in a study of Bombay sex workers present anecdotal evidence showing that the fear of a loss in income is one of the most important factors deterring sex workers from using condoms, even after they are made aware of HIV/AIDS and the role that condoms play in preventing it. There are, however, no good quantitative estimates of the size of this compensating differential for safe sex which is a potentially important problem in formulating effective AIDS prevention strategies. If the compensating differential is large, it would suggest that HIV/AIDS interventions among sex workers may need to find ways of devising incentives to counter the possibility of lowered earnings while actively educating clients and sex workers about the dangers of not using condoms. Therefore, underestimating the size of the compensating differential could adversely impact our ability to prevent the transmission of the disease. Despite the importance of the topic, the literature on the economics of "the world's oldest profession" is very sparse. Ahlburg and Jensen (1998) in a summary of the literature on the commercial sex industry and its implications for HIV/AIDS prevention policies, show that there is a total absence of econometric work on prostitution. The primary reason for this is the extreme difficulty in gathering reliable data on sex workers since the profession is practiced either illegally or, as in the case of Calcutta - the focus of our paper - on the fringes of legality.

There is, however, a growing economics literature on the AIDS epidemic which has dealt with it from different angles. The earliest work using an economic perspective is by Philipson and Posner (1995) who attempt to look broadly at what rational choice analysis could say about the progression of the epidemic and about what the most effective policy responses could be. Some further theoretical work by economists argues that the disease may be self-limiting. Kremer (1996), for instance, examines AIDS transmission in a dynamic model and shows that the prevalence of AIDS would lead people with low levels of sexual activity to be less active. On the other hand it may lead high activity people to become "fatalistic" and thus either reduce their activity only slightly or even increase it. In a mixed population with high and low activity people this creates a positive feedback by reducing the number of available risk partners -

[1] International Institute of Population Studies, *National Family and Health Survey (NFHS)*, (1992-93).

[2] The NFHS also found that only 36 per cent had heard of AIDS in 1993 (NFHS, 1993). A much smaller proportion were likely to have heard of HIV the virus that causes AIDS and therefore of the best methods of preventing it – though these questions were not asked in the NFHS survey. Another survey did ask more detailed questions and found that though 35 per cent had heard of AIDS only 4 per cent were aware of the HIV virus and of measures to prevent its transmission (Gupta and Mitra, 1999).

resulting in higher risks of infection for high activity people and low levels of risk for low activity people[3]. This self-limiting pattern would perhaps make sense in a context where the majority of risk is borne by a small closed population where AIDS awareness is high. In India, where AIDS awareness is low and testing procedures are expensive and difficult to access, sexual behaviors are less likely to be responsive very quickly in a self-limiting manner. Once AIDS awareness spreads, it is possible self-limiting mechanisms could come into play, but in the process the epidemic could have unsheathed unprecedented devastation - as we know from the African experience.

The econometric literature on AIDS has also tends to suggest that epidemiological models of the epidemic may overestimate the speed of its transmission. Ahituv, Hotz and Philipson (1996), for instance, show that condom use increased among individuals in the United States in a manner consistent with the progression of the epidemic – supporting the idea that the epidemic may be self-limiting. In a study of gay men in San Francisco, Dow and Philipson (1996), demonstrate that mating is infection dependent in that infected men are twice as likely as non-infected men to have infected partners which would also tend to slow down the progression of the disease. Here again the dynamics of disease transmission are likely to be different in the Indian context for three reasons; the demand for surreptitiously purchased sex with prostitutes is likely to remain high because of strong norms against pre and extra marital sex in the general population, infections are primarily the result of heterosexual sexual contact and therefore not restricted to a small closed population, and HIV-AIDS awareness continues to be low.

In this paper we study the incentives faced by sex workers - focussing on estimating the compensating differential for condom use with a unique data set of a random sample of commercial sex workers from the red-light area of Sonagachi in Calcutta surveyed in 1993. They were the focus of a program promoting the health of sex workers and safe sex practices that was initiated in 1992 by the All India Institute of Hygiene and Public Health in collaboration with various other organizations. We exploit the relatively random nature of selection into this program to identify the relationship between the price of sex work and condom use and thus estimate the compensating differential for safe sex. This instrument allows us to eliminate a serious source of bias common to estimates of compensating wage differentials – simultaneity and unobserved productivity (Garen 1988, Hwang, Reed and Hubbard 1992). We find that, after correcting for this bias, sex workers face a 43.7 per cent loss in the average prices they charge by using condoms. This strong disincentive against practicing safe sex practices can have a substantial adverse impact in preventing the spread of HIV-AIDS.

[3] Also see Over (1999) for a discussion on the market failures that arise because of the information asymmetries inherent in private sexual (HIV-AIDS related) behaviors.

Theory and Estimation Strategy

One can think of prices for sex work as being determined by a hedonic function relating the price to a set of characteristics.

$$P=P(\boldsymbol{X}, C) \qquad (1)$$

Where P denotes the price per sex act charged by the sex worker, **X** is a vector of attributes of the sex worker, and C is a variable denoted whether the sex worker practices safe sex, specifically whether her clients always use condoms.

As in any implicit market this function is determined by both demand and supply factors. Estimates of the impact of any characteristic on the price have to be thought of as the result of an equilibrating process. If clients have a strong preference against using condoms (Bhave 1995, Sleightholme & Sinha 1997) and sex workers would like to have condom using clients in order to protect themselves from the HIV virus, then the theory of equalizing differences (Rosen, 1986) suggests that we should observe a negative relationship between condom use and the average price charged by the sex worker. The actual compensating differential would reflect the point at which the market reaches equilibrium given the attributes, income and preferences of sex workers and their clients. Estimating such compensating differentials, however, is not a straightforward exercise and problems of unobserved heterogeneity can cause serious biases in the estimates. Hwang, Reed and Hubbard (1992) point out that unobserved productivity, even if it is not correlated with observed measures of productivity, can cause a large positive bias in estimates of the compensating differential. This is because workers with higher values of the unobserved attribute are more likely to have greater earnings as well as more likely to choose less risky job attributes, since both are normal goods. Consequently, estimates of the hedonic wage equation will be biased in a direction opposite to the (true) compensating differential. Various approaches have been employed to deal with the problem, including the use of panel data (Duncan and Holmlund, 1983) and instrumental variables (Garen, 1988). While we lack panel data, participation in the safe sex training program provides us with a valuable instrumental variable that is able to correct the bias inherent in OLS estimates of effect of condom use on wages of sex work[4].

[4] Our identification strategy is similar to those employed by other studies that use natural experiments as instrumental variables (Angrist and Krueger, 1999).

In order to justify our identification strategy it may be helpful to describe Sonagachi and its sex workers. Sonagachi is the oldest and best-established red-light area in Calcutta and has been in existence for at least 150 years. It is located close to Calcutta University which provides a steady source of clients, and like many other older Calcutta neighborhoods consists of a dense network of narrow, winding streets lined by two and three story buildings. Each building usually contains several brothels offering a wide range of services to a wide range of clients. At the upper end a brothel can consist of one or two air-conditioned private rooms with English speaking sex workers. At the bottom end, a brothel can consist of a large room sub-divided by curtains into several booths each containing a bed. At any given moment a lower-end brothel may be servicing five or six clients in the same room. The brothels are supported by a number of restaurants, teashops, bars and other businesses that serve sex workers and their clients in the area. The sex workers are almost always part of a brothel under the ownership of a madam or pimp. They are required to pay fifty per cent of their earnings as rent and “protection” to the person controlling the brothel. The market is quite competitive with over 4,000 sex workers working in 370 brothels servicing about 20,000 clients a day (AIIH&PH, 1997). Calcutta is one of the world's largest cities with an estimated population 13 million of which 31 per cent are migrants. This results in a male dominated sex ratio with 0.83 females for every male in the population that in turn causes the demand for sex work to be consistent and high.

As in other implicit markets, sex workers are compensated on the basis of a set of different characteristics - their physical attributes (age, skin color, beauty), their level of education, and the type and quality of services they provide. Vaginal sex is the most typical service provided and is practiced in almost all the transactions. Oral and group sex are also prevalent, while anal sex is practically non-existent. While rates are to some extent determined by negotiation, the market is large and competitive and there is a good sense of the "correct" wage or price with differences arising from the sex workers age, physical attributes and her level of education.

In September 1992, the All India Institute of Public Health and Hygiene began a program in Sonagachi that attempted to provide basic health care facilities to sex workers and their families while also educating them about HIV/AIDS and the methods to prevent it. The HIV/AIDS information was communicated in a manner that proved to be both innovative and effective. Initially, a group of twelve sex workers were recruited to become peer educators. They were given intensive training on AIDS and other aspects of health care, provided with green coats to identify them as medical workers, and sent into the community to promote safe sex practices. The primary tool they employed for this purpose was a flip chart that used a series of pictures to explain the nature and progression of the HIV virus, its effect on the human immune system, and how the use of condoms was the most effective method of preventing the disease.

They also carried condoms with them to distribute to the sex workers free of cost while demonstrating their proper use. Sex workers who wished to use condoms could also pick them up for free from nearby locations -- thus condoms were available in virtually unlimited supply at zero cost.

The method used by the peer educators to contact sex workers is a crucial part of our identification strategy; Sonagachi is located within one city block about 30 acres in area[5]. It is bounded on the east by a major road – still best known by its old British name Central Avenue, but currently named Satindra Mohan Avenue - and on the west, north and south by smaller streets. The brothels are located on a network of dense, crooked, tiny lanes and gullies - too narrow to fit an automobile - that inter-connect the larger streets that border Sonagachi. We were told that the peer educators began targeting brothels on September 1992 starting at the north-east end. They then moved west towards the street at the western border, moved south to the next lane and worked their way back east, and then repeated the process. Contacting sex workers at the rate of about 40 to 50 a day, they had shown the flip-chart to about 53 per cent of the population by the time the survey was conducted in November 1993. The brothels are not located in any systematic pattern, with high and low class brothels often operating out of the same building. Consequently, the peer educators did not contact sex workers on the basis of their income, age, or any other productive characteristic: they would simply target one set of brothels and move on to another set the next day.

Prior to this contact with peer educators most sex workers did not have any detailed knowledge of the HIV-AIDS or a sense of how safe sex practices could prevent its transmission. Thus flip charts shown by peer educators were the first time that most sex workers received accurate and complete information on HIV-AIDS. Since the flip charts were not administered in a systematic manner and were effective tools in encouraging safe sex while providing sex workers with access to free condoms, they can be potentially used to identify the compensating differential for condom use. However, besides the assertion by the administrators of the program that access to peer educators did not depend upon prices or any productive attributes, it is still possible that the peer educators may have found it easier to reach some sex workers in a systematic manner. We shall attempt to account for this possibility by introducing an equation that determines the access of sex workers to peer educators by exploiting the procedure used for enumerating sex workers in the household survey.

The enumeration procedure for the survey, coincidentally, followed approximately the same pattern as the flip-chart intervention. The enumerators started at the northeast end of the block, listed all the brothels in the grid at that end and worked their way west, and then south and back east, till all the brothels were listed. The size of each brothel was also noted. A random sample of brothels was chosen and a random sample of sex workers chosen in each sampled brothel with the sample per brothel determined by

[5] This number is a rough estimated calculated by measuring distances on a map of Sonagachi.

its size. Each sex worker in the sample was given an identification number that indicated the sequence in which they were contacted by the survey interviewers. The similarity of the manner by which sex workers were targeted by the flip chart intervention and the enumeration procedure for the survey has resulted in a (negative) correlation between the identification number of the sex workers in the sample, and the probability that the sex worker was targeted by a peer educator. The correlation is not perfect because the survey enumerators did not list brothels in *exactly* the same sequence as they were visited by peer educators. The dense, mixed and irregular placement of brothels in the neighborhood would make this next to impossible, but at the same time it ensures that the survey identification numbers are not correlated with prices or sex worker attributes. The ID numbers are, on the other hand, a good proxy for the process that determined the probability that peer educators contacted sex workers.

Our estimation strategy is thus developed to alleviate two concerns. First, and foremost, we wish to estimate the relationship between condom use and prices in a manner that minimizes endogeneity bias by using the flip-chart variable to identify condom use independently of its relationship to prices. Secondly, we would like to simultaneously address the concern that the flip-chart variable may not have been randomly assigned.

The equation we are primarily interested in estimating is the hedonic function determining prices for sex work (1), which in log-linear form can be expressed as:

$$Ln\ P_i = \beta_1 X_i + \gamma C_i + \varepsilon_{1i} \qquad (2)$$

where P_i denotes the average rate per act charged by the sex worker i, $\boldsymbol{X_i}$ is a vector of attributes of the sex worker, and C_i is a binary variable denoting whether the sex worker practices safe sex, specifically whether her clients always use condoms, β_1 and γ are vectors of unknown parameters, and ε_{1i} is an error term. To reiterate, the problem with estimating equation (2) is the possible endogeneity of condom use, i.e., that C_i may be correlated with the error term ε_{1i}. The intuition behind this correlation is that sex workers with higher values of the unobserved attribute are also more likely to have greater earnings as well as more likely to choose condoms. For example, consider the bias caused by physical attractiveness which is perhaps the most important attribute in determining earnings from sex work and is also very difficult to measure. Since it is unobserved, estimates of the impact of condom use on sex worker wages can be seriously biased because sex workers who are relatively attractive and consequently have a high demand for their services may also be more willing to "purchase" safe sex by using condoms. However, their earnings would remain high relative to the other sex workers. This would cause condom use to incorrectly show a positive

correlation with the average rate per act, which is a problem similar to the bias caused by unobserved productivity on estimates of compensating differentials in other labor markets.

Suppose that the equation determining whether a sex worker always uses condoms in a linearized form is:

$$C_i = \beta_2 \boldsymbol{X_i} + \delta S_i + \varepsilon_{2i} \qquad (3),$$

where S_i is a binary variable indicating if the sex worker *i* has seen the flip chart, β_2 and δ are vectors of unknown parameters, and ε_{2i} is an extreme value error term.

A natural approach to correct for the endogeneity bias in equation (2) would be, for example, to use instrumental variables (IV) (e.g., Garen, 1988) or to estimate equation (2) simultaneously with equation (3) under some assumptions about the joint distribution of the error terms of these two equations. As long as the excluded variable in equation (3) - contact with a peer educator - is not correlated with the source of unobserved heterogeneity, condom use can be instrumented to correct for the bias. However, some concerns may be raised of whether the excluded variable itself is exogenous in equation (3). If it is not, or in other words, if S_i is correlated with ε_{i2}, our estimates would not be valid. To respond to this critique we estimate the equations (2) and (3) jointly with an equation that determines whether the sex worker has had contact with a peer educator.

$$S_i = \beta_3 \boldsymbol{X_i} + \chi N_i + \varepsilon_{3i} \qquad (4),$$

As an excluded variable for that equation we use the identification number assigned to the sex worker in the process of conducting the survey N_i , which identifies the sequence in which the sex worker was interviewed and is thus a proxy for the process of program placement and independent of ε_{3i}. β_3 and χ are vectors of unknown parameters, and ε_{3i} is an extreme value error term.

We, therefore, simultaneously estimate a system of equations:

$$Ln\ P_i = \beta_1 X_i + \gamma C_i + \varepsilon_{1i} \qquad (2)$$

$$C_i = \beta_2 \boldsymbol{X_i} + \delta S_i + \varepsilon_{2i} \qquad (3)$$

$$S_i = \beta_3 \boldsymbol{X_i} + \chi N_i + \varepsilon_{3i} \qquad (4)$$

Suppose that the joint probability density function of the error terms, ε_i's, is represented by $f(\varepsilon_{i1}, \varepsilon_{i2}, \varepsilon_{i3})$. Then, the individual contributions to the likelihood function can be represented by:

$$\text{(5)} \qquad L_i = \int_{-X_{i1}\beta_1}^{\infty} \int_{-X_{i2}\beta_2}^{\infty} \int_{-X_{i3}\beta_3}^{\infty} f(u_1, u_2, u_3)\, du_3 du_2 du_1$$

Under the assumption of joint normality, the distribution of the error terms (5) can be approximated using Gauss-Hermite quadrature [See Judd (1998)]. This method of estimating integral (5) relies on the fact that the unconditional joint distribution (5) can be presented as a weighted sum of products of univariate conditional distributions. The log-likelihood function $\Im$ for the system of equations is then:

$$\Im = \sum_{n=1}^{N} Log \left\langle \sum_{m_1=1}^{M_1} w_1 \sum_{m2=1}^{M_2} w_2 [PR^1\left(X_i^1\beta^1 \mid v_{m_1}, v_{m_2}\right) PR^2\left(X_i^2\beta^2 \mid v_{m_1}, v_{m_2}\right) NR\left(X_i^3\beta^3 \mid v_{m_1}, v_{m_2}\right)] \right\rangle$$

where N is total number of observations in the sample, $PR^{\tau}(\bullet)$ are the cumulative distribution functions for the flip chart (program participation) equation (4) and condom use equation (3) conditional on the common factors, and NR($\bullet$) is conditional on the common factors, v's and w's are correspondingly one-dimensional quadrature points (nodes) and weights from a Gauss-Hermite rule (Stroud and Secrest, 1966), M's are the numbers of quadrature points. X's represent the equation specific sets of explanatory variables and β's are the vectors of unknown parameters to be estimated[6].

Data and Results

As explained above, the data for this analysis are from a random sample of 608 sex workers in Sonagachi from a survey conducted in 1993. The sex workers were surveyed by a

[6] The estimations presented in the paper are based on the approximation of the probability integral by Gauss-Hermite quadrature with six nodes for both common factors. Parameters of the model are estimated by maximum likelihood using the DFP algorithm (Powel 1977) with analytical derivatives. The variance-covariance matrix of the estimated coefficients is estimated by approximating the asymptotic covariance matrix by the so-called "sandwich" estimator (see, for example, Davidson and MacKinnon 1993, 263). Further increase in the number of nodes fail to result in an improvement in the value of the log-likelihood function. According to the likelihood-ratio test criterion, the independent error specification is rejected in favor of the FIML specification that assumes a joint normality of the error distribution.

team of social workers under the supervision of the All India Institute of Hygiene and Public Health (AIIH&PH). AIIH&PH had a presence in Sonagachi for more than a year at the time of the survey, providing free medical care, and were therefore, by all accounts, able to establish excellent rapport with the sex workers (Sleightholme and Sinha, 1997). This makes it very likely that they were able to elicit accurate responses and minimize the extent of measurement error[7]. While the survey instrument was primarily focussed on medical evaluations, a number of socio-economic questions were also asked. It should be noted that there are two main limitations in the survey from the perspective of estimating compensating differentials. Clients were not surveyed, which prevents us from saying anything about the demand side of the market, and questions on prices were not based upon different types of service but on the average price charged per act. Therefore, while we know the average price charged by a sex worker we do not have direct information about how this changed if the sex worker used condoms or varied the type of service offered

For the vector **X** denoting sex worker characteristics we will include her education - divided into three categories for primary school (4th), middle school (7th) and high school and above (10th). We will also include the sex worker's age in years which is an attribute of her physical attractiveness, as well as the number of children she has which could also be correlated with her physical attractiveness. To account for her experience and bargaining power we include her tenure in the profession in months and whether she was married before becoming a sex worker. We also include two variables that could affect her decision to use condoms - whether she has been sterilized which would negate her need to use condoms as a form of contraception, and whether she visited a medical clinic in the month prior to the survey which may have an influence on her propensity to practice safe sex. For the condom use variable *C* we will use a binary classification asking if she always uses condoms or not, and *S* which is excluded from the price equation is also a binary variable denoting whether the sex worker has seen the flip chart. Thus, we will estimate the impact of always using condoms on a sex worker's average wage per act. The survey identification number, N_i ranges from 1 to 608 - the size of the sample.

Results:

In interpreting these results it is important to keep in mind the circumstances underlying the market for sex work in India. It is a highly stigmatized activity and women who enter the profession are rarely able to participate in mainstream social activities and see themselves as "fallen." In most instances they are cut off from their families, even though some continue to send them remittances. Children of sex workers

[7] See the AIIH&PH report (1997) for more details.

cannot find spouses from mainstream society and have to marry within the community - also indicative of a sex worker's status as an outcaste. The reasons why women enter sex work are several. In an ethnographic study of Sonagachi, Sleightholme and Sinha (1997) suggest that many enter the profession in order to escape violent husbands, or to support themselves after being abandoned by their husbands. Given the near impossibility for an abandoned woman to find another husband and her need to support themselves and her children, she is faced with the desperate choice between destitution and prostitution. Women also enter the profession because they are tricked into joining it by touts promising them jobs as nanny's or domestic servants, and once they are trapped into it they find it difficult to leave.

The sex workers in Sonagachi are reputed to be the most prosperous in Calcutta. Figure 1, which provides a diagram of the kernel density estimate of the average rate per act also shows that they are a highly heterogeneous group with wide variations in their wages. The median of the average price charged is forty rupees, but average prices per act range from a minimum of Rs.15 to a maximum of Rs. 600[8]. Ninety per cent of the sex workers charge less than Rs.100, and 25 per cent charge less than 30 rupees. This heterogeneity is also reflected in sex worker characteristics that have been summarized in Table 1. The average weekly income of a Sonagachi sex worker in 1993 was Rs.984. Assuming, on the basis of informal interviews, that the average sex worker gets one day off, works about 10 hours a day, and gives 50 per cent of her earnings to her madam, this indicates an approximate hourly wage rate of Rs. 8.20. This is considerably higher than the hourly wage rate of women in urban India where it approximates Rs.4.50 (Kingdon, 1998). Thus, despite the considerable hardships they face, sex workers are in a extremely lucrative profession - this perhaps explains why 9% say that they entered the occupation voluntarily (Singh, 1995), despite its extremely stigmatized status.

The average age of a sex worker is 23 with a range from fourteen to fifty. About 21 per cent of them have had some schooling, with 18% having completed middle school, and 5% with a high school education or above. On average, they enter the profession at age 19, and 19% were married before they entered the profession. This is consistent with anthropological evidence from Sonagachi showing that two important reasons why women enter the profession are abandonment by their husbands and widowhood (Sleightholme, 1996). Several of them have children, with 0.6 children on average. The female sterilization rate is about ten per cent, and about 42 per cent of them were medically treated in previous month. Finally, note that 47 per cent of the sex workers always use condoms and 54 per cent have been targeted by the peer educators and have seen the flip chart.

[8] There are 4 outlying average rates that exceed 210 rupees that are omitted from the analysis. Note that while the distribution of prices is highly skewed, the log price specification that we employ results in a distribution that is close to normal.

Table 2 presents results from estimates of equations (3) and (4) assuming that the error terms are jointly independent. 2A presents probit results of the determinants of condom use. Firstly, note that controlling for all the **X** variables, sex workers who have encountered a peer educator are about 12 per cent more likely to always use condoms. Sex workers who have been to the AIIPH&H clinic for medical treatment are about 7 per cent more likely to use condoms, though this is not significant at the 5 per cent level. Condom use is also is higher among younger sex workers and, and to an extent, among the better educated since those with a middle school education are 16 per cent more likely to use condoms than uneducated sex workers. Neither female sterilization nor number of children significantly affects condom use indicating that condoms are not being used as contraceptives. Table 2B presents OLS estimates of equation (2), the hedonic price equation, in a log price specification. Condom use in this specification shows a positive but non-significant effect consistent with our belief that these estimates may be biased upward because of unobserved heterogeneity given the strong preferences among clients against using condoms.

Table 3 reports the results from the FIML estimates of the system of equations (2), (3) and (4)[9]. The flip chart equation estimates are reported in table 3A. Note that the survey ID number is negatively correlated with seeing the flip chart at a 5 per cent level of significance. This is consistent with notion that the processes of program placement and survey enumeration were similar; Sex workers with higher numbers were less likely to have been targeted the peer educators because the route followed by peer-educators was similar to the route followed by the survey enumerators. Most of the other sex worker attributes do not show a significant relationship with the flip-chart indicating that program placement was unlikely to have been related to most of the observed characteristics. However, if a sex worker was married prior to joining the profession she is significantly less likely to have seen the flip-chart. The reason for this is unclear, but one possibility is that brothels with a high proportion of married sex workers are run by madams who may have been more resistant to allowing access to peer educators.

Table 3B provides FIML estimates of equation (3) determining condom use. The most important effect to note here is the impact of seeing the flip-chart which increases the probability of using condoms by 28 per cent, at a 1% level of significance. Condom use also increases with higher levels of education; sex workers who have primary schooling are no different from those who have no schooling, but those with

[9] Note that our model is estimated under a restrictive assumption about the normality of joint distribution of the error terms in the system of equation (3,4,5). We tried to estimate the model without imposing such restrictions using the method suggested by Heckman and Singer (1984). This method allows to non-parametrically estimate the system of equation with a mixed distribution of the error term. However, the less restrictive estimations are less stable computationally. In our case, the optimization routine failed to converge for the non-parametric specification of the model and we had to switch to a more restrictive model to obtain stable estimates.

middle and high school education show a large increase in condom use. Once again we see that sterilization and number of children has no impact on condom use suggesting that condoms are not used as contraceptives but as a STD/HIV prevention mechanism.

Finally, Table 3C reports FIML estimates of the determinants of log prices. First, note the negative and highly significant impact of condom use on prices. The estimates indicate that using condoms reduces prices per act by 43.7 per cent. This large reduction in prices obtained by sex workers represents a significant disincentive against using condoms, and is consistent with the anecdotal evidence presented by Bhave et. al. (1995) that the fear of lower incomes is the one of the most important roadblocks against increasing condom use among sex workers. Any HIV-AIDS intervention strategy involving sex workers in a population such as India's with strong preferences against condom use will have to contend with the fact that even with full knowledge about HIV, economic imperatives may dissuade large numbers of sex workers from using condoms.

The regression also shows large and significant returns to schooling. Sex workers with primary schooling make about 4.2 per cent more than those with no education, while those with middle schooling make about 22 per cent, with high school giving a 16 per cent premium over no schooling. These returns are comparable with published estimates of returns to schooling in urban India for women who work in more conventional occupations. Kingdon (1998) for instance finds returns to schooling for women of between 4.9 and 9.6%, depending upon the specification used. The primary difference between returns to schooling in sex work and other types of women's work is that most of the gains in sex work come having a middle school education because returns to high school are not significantly different from middle school. Returns to schooling in other occupations, however, show a big increase at levels beyond High School (Kingdon,1998). Given that hourly wage rates in sex work are almost double the rates in other types of work, this once again emphasizes that prostitution is a lucrative profession even for relatively well educated women. Why do we observe positive returns to schooling in sex work? It is, after all, a primarily physical activity that does may not demand much more from educated women than it does from the uneducated. One possible reason is that more educated women may attract more educated clients, and are therefore able to charge more for their services. In other words, if sex work can be thought as a hedonic good, education allows more educated sex workers to match assortatively with more educated clients, leading to a segmented labor market with higher equilibrium prices charged in more educated segments[10].

The progress of HIV-AIDS in developing countries is thus affected by an entirely different set of incentives than the self-limiting patterns observed in the US (Ahituv, Hotz and Philipson (1996), Dow and Philipson (1996)). Given that sex workers are central nodes in the networks of transmission, these

[10] This is similar to what may happen in a hedonic marriage market (Rao,1993).

incentives in societies like India's are much more likely to be based upon explicitly market based calculations rather than private negotiations between consenting partners. Even if the sex workers are eager to reduce their risk of transmission, poverty is unlikely to allow them to do so unless their clients begin to comply. Thus, in the absence of quick and widespread acceptance of condoms by male clients, the epidemic will be very difficult to control. Furthermore, these male clients are not, generally speaking, a small selected proportion of the population. Social norms that prevent sex between men and women outside marriage drive a large number of men, particularly migrants, into seeking sex with sex workers. One indicator of this is that Mumbai, India's largest city, has twice the population of New York but twenty times the number of prostitutes (Hwang, 2001). So long as demand for sex work continues to be this high, and condom use remains low, HIV infections are likely to increase very quickly. The disease is also unlikely to remain restricted to high-risk individuals since infected men will very likely, in turn, infect their wives.

Conclusion

To summarize the main findings in this paper, we have attempted to estimate the compensating differential for condom use for a sample of sex workers in Calcutta from 1993. An intervention program was instituted in 1992 which brought sex workers into contact with peer educators who instructed them about AIDS and safe sex practices, and was administered in a non-systematic manner. By 1993 fifty three per cent of the sex workers had come into contact with a peer educator. We attempt to exploit the non-systematic process by which sex workers were targeted by peer educators to identify the impact of condom use on earnings – which would otherwise be biased by unobserved heterogeneity. We find that condom use results in a 43.7 per cent loss in the average price per act which represents a significant disincentive against practicing safe sex. In order to institute effective interventions among sex workers it is crucial that this fact be taken into consideration.

The policy implications of this finding are therefore quite important. To construct an effective anti-HIV strategy among sex workers it is important to remember that the compensating differential for safe sex arises because clients are unwilling to use condoms, a fact that has to do both with a lack of awareness about HIV-AIDS and an inherent preference for condom-free sex. Thus, a demand-driven approach could mount large scale HIV-AIDS information and awareness campaigns among clients and attempt to increase their willingness to use condoms. A supply-side approach would focus on reducing competition between sex workers who use condoms and those that do not. Sex workers could be encouraged to form self-governing unions that would impost strong sanctions against selling sex without a condom. Sanctions against condom free sex could also be instituted and enforced by the government but this may require the

legalization of the profession. The increase in sanctions against not using condoms would directly increase the incentives to use condoms and reduce the compensating differential for condom use by reducing the availability of condom-free sex[11]. It may also reduce overall demand for sex work, but in the long run as AIDS awareness increases among clients, sex workers who practice safe sex may even see an increase in demand[12].

[11] Following this survey, an intense combination of demand and supply side approaches was employed in Sonagachi (AIIH&PH, 1997). Anecdotal evidence suggests that condom use is consequently widespread now, and recent surveys show that HIV infection levels have stayed low at 5 per cent in comparison with the 60 or 70 per cent levels prevalent among sex workers in most other Indian cities where such programs have only recently been instituted (Hwang, 2001).

[12] An important issue left unanswered by this analysis is the supply response of sex workers who face lower prices. Do sex workers respond to lower prices by increasing the number of clients they see and thus raise their total earnings, or do they reduce their supply of services because of the lower returns to sex work? This survey is not equipped to address this question because are no adequate instruments to identify the supply response of sex workers independently of prices.

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Table 1

Descriptive Statistics

Variable	Mean	Std.Dev.
Average Rate Per Act – 1993 Rupees	49.936	32.457
Age	23.273	5.576
Months in Sonagachi	47.235	
Primary School (4th Grade)	0.031	
Completed Middle School (7th Grade)	0.123	
Completed High School (10th Grade)	0.054	
Married Before coming to Sonagachi	0.192	
Number of Children	0.631	0.860
Sterilized	0.102	
Medically Treated Last Month	0.424	
Seen Flip Chart	0.535	
Always Uses Condoms	0.473	
Survey Identification number	306.500	176.813

Figure 1

Kernel Density of Real Rate Per Act

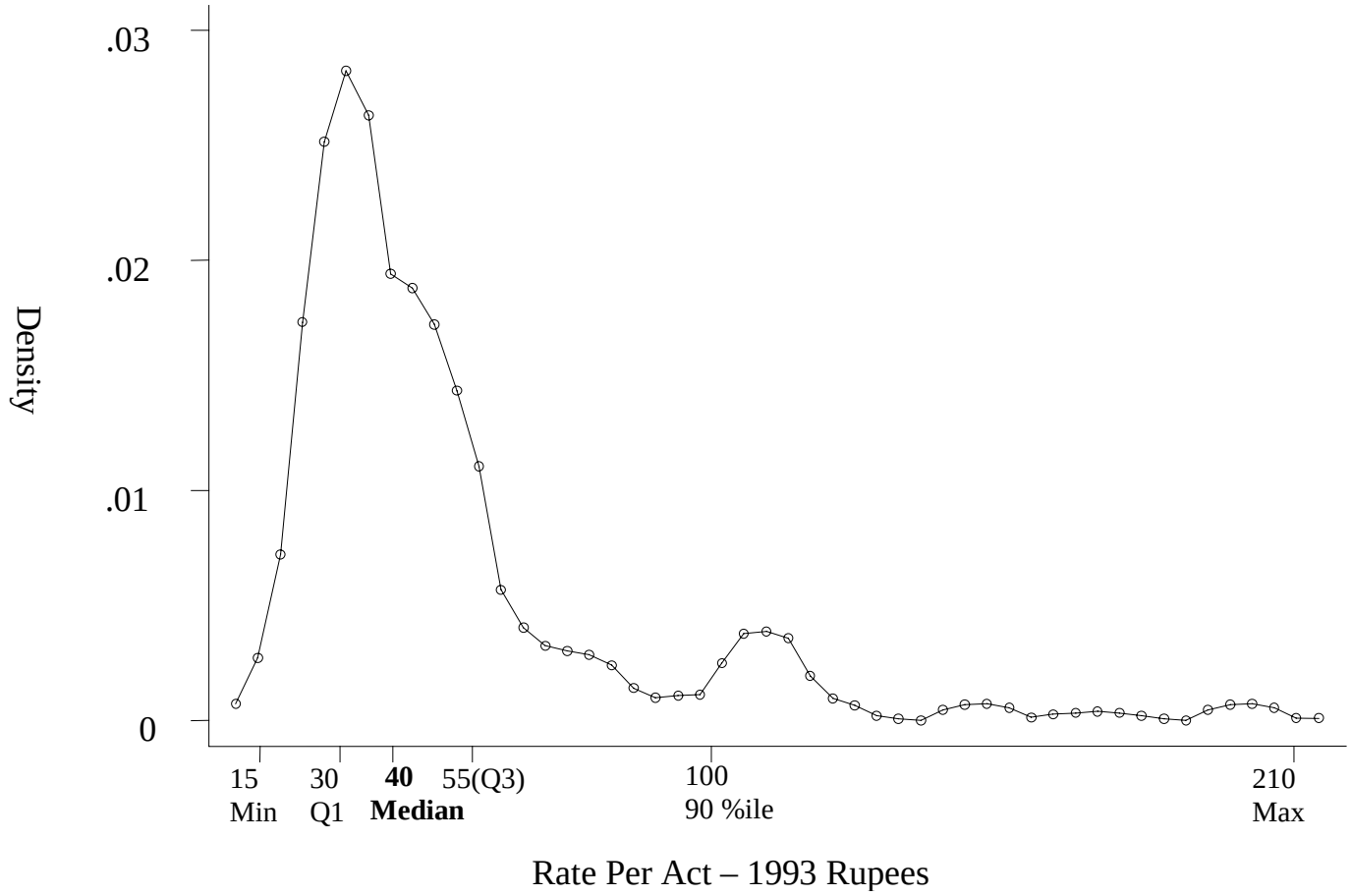

Table 2

Single Equation Estimates of Condom Use and Prices

(Standard Errors are Heteroskedasticity Corrected)

Variable (N=608)	**A. Condoms Always Used (Probit)**		**B. Log Average Rate Per Act - Structural**	
	Partial Derivative	|*z*|	*Coefficient*	|*t*|
Age	-0.0097	1.8	-0.0094	2.2
Years in Profession	0.0006	1.2	0.0003	0.7
High School (10+)	0.1132	1.2	0.3198	3.9
Middle School (7th Grade)	0.1560	2.5	0.3029	4.5
Primary School (4th Grade)	0.0876	0.7	0.0217	0.2
Married	-0.0895	1.6	-0.1904	5.0
Number of Children	0.0175	0.6	0.0299	1.1
Sterilized	-0.0970	1.3	-0.0413	0.6
Medically Treated Last Month	0.0740	1.8	-0.0555	1.4
Seen Flip Chart	0.1122	2.5	---	--
Condom Always Used			0.0520	1.3
Constant			3.9338	43.7
Pseudo R-Squared/R-Squared	0.03		0.09	

Table 3: FIML estimation of the system of equations (2-4) for Program Participation, Condom Use and Prices

Variable (N=608) L0=-1117.64 L1=-1076.55 P>(Chi2) <=0.01	**A. Seen Flip Chart Binary outcome equation**		**B. Condom Always Used Binary outcome equation**		**C. Log of price Continuous outcome equation**	
	Coefficient	|*t*|	*Coefficient*	|*t*|	*Coefficient*	|*t*|
Age	3.75	0.27	-4.91	-1.23	-0.99	0.96
Years in Profession	9.49	0.72	1.51	0.37	0.71	0.77
High School (10+)	2.41	0.66	1.23	2.35	0.49	6.12
Middle School (7th Grade)	0.62	0.68	1.79	3.92	0.51	9.39
Primary School (4th Grade)	-0.87	1.31	0.33	0.37	0.13	1.87
Married	-2.46	2.26	1.00	1.65	0.15	1.45
Number of Children	-0.39	0.73	0.41	1.31	0.01	0.24
Sterilized	0.74	0.44	-0.44	0.78	0.04	0.43
Medically Treated Last Month	-0.31	-0.47	0.40	1.41	-0.05	1.05
Street code/1000	-25.07	-2.12	---	---	---	---
Seen Flip Chart	---	---	2.22	3.61	---	---
Condom Always Used	---	---	---	---	-0.57	8.72
Constant	-6.23	1.02	-1.54	-1.44	4.08	8.99

Note: L_0 is the value of the log likelihood function for the estimation under the assumption of the independence of the error terms of the system of equations, and L_1 is the value of the log likelihood assuming that the cross-equation error terms are correlated.