Sex Sells, but Does Risky Sex Sell for More?

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October 21, 2002
Very Preliminary Version

Abstract: Each day close to 20,000 people become infected with the HIV virus worldwide; a large portion of which are infected through unprotected sex with commercial sex workers. While condoms are an effective defense against the transmission of HIV and other sexually transmitted infections, large numbers of sex workers are not using them with their clients. We argue that sex workers are willing to take the risk because clients are willing to pay more not to have to use a condom. Using a panel data set from Mexico, we estimate that commercial sex workers received a 24 percent premium for unprotected sex from clients who requested not to use a condom. However, this premium jumped to 47 percent if the sex worker was considered very attractive—an indication of her bargaining power. These results suggest that the current supply-side policies aimed at educating sex workers about risk and empowering them are insufficient to significantly increase condom use. Rather, complementary interventions aimed at reducing the demand for not using condoms are needed.

Each day close to 20,000 people become infected with the HIV virus worldwide; a large portion of which are infected through unprotected sex with commercial sex workers (UNAIDS, 2002). While condoms are an effective defense against the transmission of HIV and other sexually transmitted infections (STIs), large numbers of sex workers are not using them with their clients (World Bank 1999). Indeed, infection rates among sex workers are among the highest of any group in countries with serious HIV problems (Table 1). A major question confronting governments, international agencies, and non-governmental agencies that design and implement AIDS prevention interventions is "why sex workers risk infecting themselves with HIV and other STIs by not using condoms in their work?"

Much of the health policy literature argues that in many cases sex workers engage in unprotected sex because they are uninformed of the risks (World Bank 1999; Lau, Tsui, Siah, and Zhang 2002). And in the cases where sex workers are aware of the risk, many hypothesize that non-condom use occurs because condoms are either very expensive or not available at all (Negroni et al 2002) or because sex workers are forced to have unprotected sex (Karim, Karim, Soldan, and Zondi, 1995; World Bank, 1999; Bronfman, Leyva, Negroni 2002).

The recommended policy responses are to intervene on the supply side of commercial sex (World Bank, 1999). The first steps are to educate sex workers so that they are no longer uninformed and to increase access to inexpensive condoms. Then the policy responses to address the problem of women being forced into sex work depend on the operative mechanism. If women are physically forced (enslaved) then the recommended policy is to implement and enforce laws against human trafficking, rape,

assault, and indentured servitude. If women are "forced" by the social/cultural norms in which sex work occurs, then the recommended response is to change those norms by working with gatekeepers such as brothel owners and the police, as well as on creating organizations of sex workers that empower them in their work setting by giving them the agency to enforce condom use. To the extent that women are "forced" into risky commercial sex because of economic desperation, the recommended policy is to provide job training, alternative employment opportunities, and access to micro-credit.

Ignorance does exist and the forced exploitation of commercial sex workers does occur. However, another possible explanation for why unprotected commercial sex occurs is that sex workers are willing to take the risk if they are adequately compensated. Indeed, economic theory has long posited the general principle of compensating wage differentials (Rosen, 1986). Wage differentials that compensate for risky work activities are well documented in other labor sectors (Viscusi 1992, Siebert and Wei 1998). Similarly, child car seats, safer cars, and other risk reducing products are priced higher by the market because consumers are willing to pay for safer products (Viscusi, Vernon, and Harrington, 2000). In this paper, we show that commercial sex workers also are risking infections by selling unprotected sex for higher compensation.

This result is critical for the development of policy that is effective in increasing condom use in commercial sex and consequently reducing the transmission of HIV and other sexually transmitted diseases. When some clients are willing to pay substantial sums for unprotected sex, supply side intervention alone, such as increasing access to condoms along with sex worker education and empowerment, are unlikely to sufficiently reduce unprotected commercial sex. Even knowledgeable sex workers with condoms,

who are free to turn down clients, might be willing to supply unprotected sex if the price is right. In this case, complementary interventions on the client side that reduce the demand for unprotected sex are also necessary in order to increase condom use in commercial sex. However, client-based interventions are likely to be more difficult and more expensive to implement.

In this paper, we construct a simple bargaining model of commercial sex that has a number of empirically testable predictions. The model predicts that the price differential between protected and unprotected sex is a weighted average of the maximum the client is willing to pay for not using a condom and the minimum the sex worker is willing to accept to take the risk of infection by not using a condom. The weights are a function of the relative bargaining power of the client and sex worker. The greater the sex worker's bargaining power, the closer the price differential is to the maximum the client is willing to pay. Surprisingly, the model also predicts that when the client is worried about the risk of infection from unprotected sex, he may be charged more for using a condom than for unprotected sex.

We test these predictions and find strong support for the model using a data set that we recently collected in Mexico. We estimate that commercial sex workers received a 24 percent premium for unprotected sex from clients who requested not to use a condom. However, this premium jumped to 47 percent if the sex worker was considered very attractive—an indication of her bargaining power. We also found that clients who requested condom use paid 8 percent more for protected sex.

An issue for the empirical analysis is that condom use is not exogenous to the price of services because of sex worker heterogeneity and client sorting based on sex

worker characteristics. Sex workers who have a preference for condom use may also charge higher prices regardless of condom use. And clients who have preferences for condom use and who are willing to pay more may be selecting sex workers who also have preferences for condom use.

In order to control for the endogeniety of condom use, we collected information on the last three to four transactions for each sex worker to create a panel data set. We then estimated the price models using a fixed effect for each sex worker to control for bias from both unobserved sex worker heterogeneity and client selection based on unobserved sex worker characteristics.

While there is anecdotal evidence that sex workers charge more for sex without a condom (Ahlburg and Jensen 1998), there has been little formal work that has tried to test this claim. The one exception, to our knowledge, is Rao *et al* (2002) who investigated the price differential for with and without a condom in India and report that sex workers who use condoms earn 66 percent less that those who do not use condoms.

However, it is not clear whether these estimates reflect the return to taking risk or other differences between the two populations. They used cross-sectional data to regress average price against a sex worker's characteristics and whether she reported always using condoms. They instrumented for condom use with exposure to a program that educated sex workers about the health risks of not using condoms. However, the educational intervention used as an instrument increased condom use by changing knowledge about risks and risk preferences, and possibly by changing bargaining power of the treatment sex worker group. As we will show in the theoretical model, risk preferences and bargaining power affect the price levels as well as the price differential.

1. A BARGAINING MODEL OF COMMERCIAL SEX

In order to model commercial sex transactions, we conducted a number of in-depth interviews and focus groups with female sex workers and their clients in Mexico. The market for commercial sex is characterized by tremendous asymmetric information and high search costs not only in terms of time and money but also in terms of physiological costs from possible embarrassment. There is substantial variation in sex worker physical and personality characteristics, in the services that they provide, and in the quality of those services. Similarly, there is huge heterogeneity in clients' tastes for sex worker physical and personality characteristics, and for particular services.

Clients search for sex workers in specific locations such as streets, brothels, massage parlors, bars, the Internet, and the phonebook. Clients have a general idea about the price and quality distribution, but do not know the price and quality of any particular sex worker unless they have purchased her services in the past. Clients typically approach sex workers based on physical appearance and superficial personality characteristics that they value and that may be signals of the quality of her services.

They then negotiate which services they will purchase at what price and whether a condom will be used. In some locations an intermediary such as a pimp or the owner of the brothel or massage parlor may conduct the negotiation. However, interviews with sex workers suggest that the terms are many times renegotiated between the client and the sex worker, especially when the client makes further or more specific service requests. Condom use is almost always negotiated directly between the client and the sex worker.

The market description above is consistent with the popular view of the sex market. In the movie *Pretty Women*, Richard Gere who plays Edward Lewis approaches

Julia Roberts who plays Vivian Ward on the street and based on appearance invites her

back to her hotel. They then negotiate for a week of her time:

Edward Lewis:	Vivian, I have a business proposition for you.
Vivian Ward:	What do you want?
Edward Lewis:	I'm going to be in town until Sunday. I'd like for you to spend the week with me.
Vivian Ward:	Me?
Edward Lewis:	Yes. Yes, I'd like to hire you as an employee. Would you consider spending a week with me? I will pay you to be at my beck and call.
Vivian Ward:	Look, I'd love to be your "beck and call girl," but um, you're a rich, good-lookin' guy. You could get a million girls free.
Edward Lewis:	I want a professional. I don't need any romantic hassles this week.
Vivian Ward:	If you're talkin' 24 hours a day, it's gonna cost you.
Edward Lewis:	Oh, yes, of course. All right, here we go. Give me a ballpark figure. How much?
Vivian Ward:	Six full nights, days too. Four thousand.
Edward Lewis:	Six nights at 300 is 1800.
Vivian Ward:	You want days too.
Edward Lewis:	Two thousand.
Vivian Ward:	Three thousand.
Edward Lewis:	Done.
Vivian Ward:	Holy Shit!
Edward Lewis:	Vivian, is that a yes?
Vivian Ward:	Yes! Yes!
Vivian Ward:	I would've done it for two thousand
Edward Lewis:	I would've paid four. I'll see you tonight

In this negotiation, the maximum the client is willing to pay was $4,000 and the

minimum the sex worker was willing to accept was $1,000. They choose to split the

difference. However, a less wealthy client who preferred short blond women would have

had a lower maximum willingness to pay. Similarly, a less attractive or less educated sex worker might have been willing to accept less and/or, because of lower bargaining power, may not have been able to capture as large a share of her client's maximum willingness to pay.

While there is competition in the market, it is less than perfectly competitive. Not only are sex workers highly heterogeneous, but also clients' tastes for sex worker characteristics are also highly heterogeneous. Clients are attracted to specific sex workers based on physical and other characteristics, meaning that other sex workers are *ex ante* inferior in their eyes. Clients also face substantial search costs. The competitiveness of the market bounds the maximum the client is willing to pay and the minimum the sex worker is willing to accept, but there is substantial room for negotiation in-between.

We now formalize this view of commercial sex transactions in a bargaining model. We begin by specifying the payoff functions to the client, whom we will call Richard, and to the sex worker, whom we will call Julia.

1.1. Payoff Functions

Let Richard's utility (maximum willingness to pay) from having unprotected sex with Julia be V and his disutility from using a condom be β. His disutility from condom use, β, is also his maximum willingness to pay not to have to use a condom. Richard's payoff from condom-protected sex with Julia is $V - \beta - P^c$, where P^c is the price he pays her for protected sex; and his payoff from having unprotected sex with Julia is $V - P^{nc}$, where P^{nc} is the price he pays her for unprotected sex. Without loss of generality, we normalize the Richard's payoff from the next best alternative use of his time to be zero.

Julia's payoff for supplying protected sex is simply the price she receives P^c.

However, her payoff from supplying sex without a condom is $P^{nc}- \gamma$, where γ is her

disutility from exposing herself to risk of infection by not using a condom. We assume

that Julia expects to get W from the next best use of her time. The value of W is the sum

of what she earns from her next-best activity plus the disutility of providing sexual

services, which can include stigma, risk of violence, risk of arrest, etc. The value of the

outside option W is the minimum that Julia is willing to accept to provide protected sex,

and $W + \gamma$, is the minimum she is willing to accept to provide unprotected sex.

1.2. Feasible Price Range

Richard and Julia will cut a deal if each gets a payoff greater than the payoff from

their next best options. When they use a condom, this implies that for Richard $V - \beta > P^c$

and for Julia that $P^c > W$. Combining these two conditions implies that his willingness to

pay for protected sex ($V - \beta$) must be greater than the minimum she is willing to accept

(W). This also defines the feasible range of prices. Where the actual price is set in this

range depends on relative bargaining power of the client and the sex worker. Similarly,

in the case where they do not use a condom, the feasible range is bounded by his

maximum willingness to pay (V) and the minimum that she is willing to accept ($W + \gamma$).

1.3. Condom Use

Since this is a model of free choice, Julia will supply unprotected sex only if both

agree to not use a condom. This will be the case if the payoff from non-condom use is

greater or equal to the payoff from condom use for both parties. For Richard this implies

that the marginal cost of not using a condom ($P^{nc}- P^c$) is less than or equal to his disutility

from condom use, β. For Julia, this implies that her marginal revenue from not using a

condom (P^{nc}- P^c) is greater than or equal to the disutility from risking infection by not using a condom, γ. Therefore, assuming that they are able to negotiate an acceptable price for sex, they will not use a condom if $\beta > \gamma$, i.e. the maximum that he is willing to pay not to use a condom is greater than the minimum that she is willing to accept to take the risk[5].

1.4. Equilibrium Prices

In this section, we assume that the maximum Richard is willing to pay is greater than the minimum that Julia is willing to accept, and solve for the equilibrium prices using a Roth-Nash bargaining framework. We begin with the case where $\beta < \gamma$, i.e. they will use a condom. In this case, we choose P^c to maximize

$$\left(V - \beta - P^c\right)^{\alpha}\left(P^c - W\right)^{1-\alpha}$$

where α is Richard's relative bargaining power and $(1 - \alpha)$ is Julia's relative bargaining power. Then, the equilibrium price of protected sex is:

$$P^c = (1-\alpha)(V - \beta) + \alpha W \quad . \tag{1}$$

The equilibrium price is a weighted average of the maximum that Richard is willing to pay for protected sex and the minimum Julia is willing to accept to supply protected sex. The weights are Julia's and Richard's relative bargaining powers, respectively.

A number of intuitive results are immediately apparent. The higher Julia's bargaining power, the higher the price. The more Richard values sex with Julia, the higher the price. The more Richard dislikes using a condom, the lower the price. The better Julia's outside option, the higher the price. Finally, the greater Julia's bargaining

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[5] One can easily confirm that both Richard's and Julia's equilibrium payoff functions are higher for unprotected sex than for protected sex when if $\beta > \gamma$ by substituting the formulas for the equilibrium prices in (1) and (2) from section D into the respective payoff functions and solving.

9

power relative to Richard's, the closer the price is to Richard's maximum willingness to pay.

In the case where $\beta > \gamma$, we solve for the price of unprotected sex by maximizing:

$$\left(V - P^{nc}\right)^{\alpha} \left(P^{nc} - \gamma - W\right)^{1-\alpha}.$$

The equilibrium price of unprotected sex is:

$$P^{nc} = (1 - \alpha)V + \alpha(W + \gamma) \tag{2}$$

The price of unprotected sex is a weighted average of the maximum Richard is willing to pay for unprotected sex with Julia and the minimum that Julia is willing to accept for supplying unprotected sex. The minimum she is willing to accept is her expected payoff from her outside option plus her disutility from taking the risk by not using a condom.

Again, there are a number of readily intuitive perditions from this result. The more Richard values unprotected sex with Julia, the higher the price. Similarly, the greater Julia's outside option, the greater the price. Also, the greater Julia disutility from not using a condom and the greater Julia's bargaining power, the higher the price and the closer it is to Richard's maximum willingness to pay.

1.5. Price Differential for Unprotected Sex

Now we can solve for the price differential between unprotected and protected sex by subtracting (2) from (1):

$$P^{nc} - P^{c} = (1 - \alpha)\beta + \alpha\gamma \tag{3}$$

The price differential increases the larger the client's disutility from using a condom and the bigger the sex worker's disutility from taking the risk. The greater the sex worker

bargaining power, the higher the price differential and the closer it gets to the Richard's maximum willingness to pay to not use a condom.

An interesting result from (3) is the possibility that Richard is charged a higher price for condom use than non-condom use. Suppose that Richard is concerned about the risk of infection and gains utility from condom use. In this case β is negative and if it is large enough, then (3) becomes negative. If Richard signals to Julia that he values condom use, then she will charge him for it.

2. ECONOMETRIC SPECIFICATION AND METHODS

In order to test the above predictions we estimate a hedonic pricing model of a commercial sex transaction, where the dependent variable is the log price of the transaction. The theoretical model suggests that the price will be a function of the client's value of having sex, the client's disutility from having to use a condom if one is used, the value sex worker's outside option, and the relative bargaining power of client and sex worker.

In order to control for these factors the log of price client i pays sex worker w to be determined by the following function:

$$\ln P_{iw} = \alpha C_{iw} + \sum_k \beta_k S_{iwk} + \sum_l \gamma_l X_{iwl} + \theta_w + \varepsilon_{iw} \tag{4}$$

where C_{iw} indicates whether the sex worker used a condom with the client, the S_{iwk} indicate whether the sex worker provided particular services to the client, the X_{il} are characteristics of the clients, the θ_w are sex worker fixed effects, and ε_{iw} is a zero mean random disturbance.

The above specification controls for the theoretical variables, but does not identify their separate effects except for the effect of condom use on price. The value to client is picked up by what the services that are provided, his characteristics, and the sex worker fixed effect that proxies for her characteristics. The sex worker fixed effects also controls for the value of the sex worker's outside option. Risk preference and relative bargaining power are controlled through the client characteristics and the sex worker fixed effect.

The key variable of interest is whether a condom is used. In fact, most of our key hypotheses concern the coefficient on condom use. Specifically, the model predicts that sex workers will be compensated by a higher price for risking infection by not using a condom. However, the price for not using a condom will be higher only if the client prefers not using a condom. Similarly, the model predicts that price for condom use will be lower than not using a condom only of the client prefers non-condom use. We test these hypotheses by interacting condom use with who suggested using the condom (client versus sex worker) and by including interactions of no condom use with who suggested not using the condom. Finally, the model also predicts that the price differential for condom use will be greater, the greater the bargaining power of the sex worker. To test this hypothesis we interact condom use with characteristics of the sex worker such as her attractiveness and her educational background.

Finally, a major concern is that condom use is not exogenous to the pricing decision for two reasons. First, sex workers who have a preference for condom use may also charge higher prices regardless of condom use. For example, if smarter sex workers have a preference for condom use and are better able to negotiate higher prices, then price and condom use will be positively correlated. However, the price will not reflect

compensation for risk taking. This is similar to the unobserved heterogeneity bias

introduced from omitted productivity characteristics in estimating compensating wage

differentials (Garen 1988, Hwang, Reed and Hubbard, 1992).

Another source of bias comes from the possibility that clients, who have

preferences for condom use, select sex workers who also have preferences for condom

use. If these clients are better educated and wealthier, then they would also be willing to

pay more for the sex workers' services. This situation again introduces a positive

correlation between price and condom use that does not reflect compensation for risk

taking.

We control for both sources basis by using a fixed effect for each sex worker to

control for bias from both unobserved sex worker heterogeneity and client selection

based on unobserved sex worker characteristics. We also directly control for client

characteristics.

3. THE STUDY SITE

We test the above theory using data from Mexico, where commercial sex work is

regulated in many Mexican states. The regulation typically includes periodic medical

screening to detect HIV/AIDS/STIs as well as periodic inspections of work sites by

government agencies (Cuadra, Leyva, Hernandez, Bronfman 2002).

Condom use amongst sex workers in Mexico is relatively high (Negroni *et al*

2002), especially in comparison to other developing countries in Asia and Africa. In a

recent study of female sex workers in Chiapas, Mexico, condom use frequency was

reported to be 55% (Valin and Egremy 2002). In our data, described below, 84 percent of

the sex workers reported using condoms in each of their last three sexual transactions. While estimates of condom use vary by study and self-reports of condom use are generally biased, sex workers tend to be fairly well informed about the benefits of condom use in Mexico.

HIV prevalence and sexually transmitted infection rates are still relatively low in Mexico. A study of female sex workers in Yucatan, Mexico finds that the HIV infection prevalence is 1% (Pavia et al 2002). Another study of female sex workers in Mexico City reports an HIV prevalence of 0.14% (Cruz et al 1996). One percent of these same women tested positive for syphilis, 1.15% were culture positive for gonorrhea, and 8% had Chlamydia (Cruz et al 1996). In our data, 17 percent of female sex workers reported having an STI or vaginal discharge in the past year. While the HIV/AIDS and STI problem in Mexico is problematic, it is not dire.

Our analyses use data from the Mexican States Morelos and Michoacan. Morelos borders Mexico City to the South and Michoacan is North-West of the City. Both are popular weekend destinations for residents of Mexico City. While both have significant migration to the USA, it is far more prevalent in Michoacan. Morelos has one of the highest rates of reported HIV/AIDS in the country, while Michoacan is closer to the median rate (CENSIDA, 2001).

4. THE SURVEY AND SAMPLE CHARACTERISTICS

In the summer of 2001 we designed a socioeconomic survey for female sex workers based on a series of in-depth interviews and pilot tests in Cuernavaca, Morelos. The implementation of the socioeconomic survey was facilitated by a much larger project

funded by the UNAIDS, the Second Generation HIV/AIDS Behavioral Surveillance Project.

4.1. Survey Sample and Content

The Second Generation project mapped the universe of commercial sex of workers and conducted behavioral surveillance amongst them in Morelos and Michoacan. Selection of theses two states was based on HIV/AIDS prevalence, previous experience with behavioral studies and willingness of the state AIDS programs to collaborate.

Once the geographic universe was defined, state-wide mapping exercises were conducted to identify the universe of commercial sex workers. The mapping methodology was to identify the gathering points for sex workers and estimate the population size at each site. This is more feasible for developing a sample frame for mobile and hard-to-reach populations such as sex workers than is enumerating each individual in the target population.

Potential sites were identified through key informants interviews (i.e. taxi drivers, police, pimps, madams, bar owners, NGO workers, medical personnel, etc.) and a snowball method.[6] Such an approach is biased in favor of sites that concentrate formal sex work and will miss most of the informal sites such as a woman who occasionally sells sex out of her house.

We attached our socioeconomic survey as a supplement to a random sample of the Second Generation surveillance survey, using the universe identified by the Second Generation project as our sample frame. Target sample sizes were calculated based on estimating the prevalence of condom use with 90 percent power and a 5 percent

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[6] As additional sex work sites are located, people in the new sites asked about the location of other sites

significance level. The survey was implemented by the Mexican National Institute of Public Health beginning in the fall of 2001 and was completed in January 2002.

A sample of 1034 sex workers responded to the socioeconomic survey, about three quarters of whom were from Michoacan and one-quarter from Moreles. The survey includes background characteristics of the sex worker and details of the last 3 transactions per sex worker in Michoacan and the last 4 transactions in Moreles for a total of 3,884 observations. For each transaction, we asked the price paid by client and the amount received by sex worker, the services provided (vaginal, oral, anal, talk, dancing, stripping, and massage), condom or non-condom use and who suggested it, as well as the sex worker's impression of her last three clients' appearance, wealth, education, personality, hygiene, abusiveness, and alcohol and drug use.

4.2. Sex Worker and Client Characteristics

The sample of women who responded to the socioeconomic questionnaire is described in Table 2. The average sex worker is 28 years old, had her first sexual experience at age 16, and has worked for about six years in the commercial sex industry. Seventeen percent of the women reported experiencing STIs and/or other vaginal problems. Twenty-one percent of the sex workers were considered to be very attractive by the interviewers. Thirty-six percent have attended at least secondary school, 22 percent are married, and 62 percent have children who live at home.

The majority of the women in this sample work in bars/clubs. Indeed, fifty percent reported consuming alcohol every day for the four weeks prior to the administration of the survey. This high percentage is indicative of the fact that bar owners pay sex workers a commission per unit of beverage consumed by both herself and her

client. Since the more alcohol consumed, the higher the payment, the incentive to drink is extremely high.

Table 3 presents some client characteristics as reported by the sex worker. Two-thirds of the clients are regular clients of the sex workers. The majority of them were in their thirties, had nice personalities, were of average attractiveness, and few were dirty.

4.3. Transaction Characteristics and Condom Use

Table 4 provides a description of the transactions as reported by the sex worker. The average price per act was 447 pesos (US $48.59) but ranged from 20 to 5,800 pesos. Almost all transactions included vaginal sex and a condom was used in 90 percent of the transactions. While most transactions included alcohol consumption by both parties, few involved drug use. Finally, two-percent of the clients physically abused the sex worker.

The key variable in the analysis is condom use. As reported above, condoms were used in 90 percent of the transactions. However, identification of the coefficient on condom use in the fixed effects estimator comes from the variation of condom use across clients for each sex worker and not variation in condom use between sex workers. Figure 1 reports the percentage of sex workers who used condoms in all transactions, in some but not all of the transactions, and in none of the transactions. Here, we find that 83 percent of sex workers used condoms in all three of their last transactions, 12 percent used them sometimes, and 5 percent did not use them in any of the transactions.

A second key variable in the analysis is to measure relative risk preferences. We do so by asking who suggested using and not using a condom. If the sex worker suggested condom use, we take this to be a signal that she is more risk adverse than the

client. Alternatively, if the client suggested using the condom, we take this as a signal that he is more risk adverse.

Table 5 summarizes who suggested using and not using a condom. Not surprisingly, when a condom was used, the sex worker suggested use 95 of the time. However, clients suggested condom use about 5 percent of the time, providing us with a key test of the model—i.e. whether prices are higher with condom use for risk adverse clients who prefer condom use.

Again not surprisingly, when a condom was not used, 67% of the time it was because the client suggested non-use. However, in 15 percent of the cases, the sex worker suggested not using a condom, indicating either ignorance of the risk, preference for risk, or other disutility associated with condom use (e.g. latex allergy, irritation, desire to become pregnant). More interestingly, condoms were not used because of supply constraints in only 17 percent of the cases, suggesting that supply constraints were not a big problem.

5.   ESTIMATION RESULTS

The estimation results of equation (4) are presented in Table 6.
In column one, we report the random effects estimation results and test whether the random effects estimates are different than the fixed effects estimates using a Hausman test. The Hasuman test overwhelmingly rejects random effects in favor of fixed effects.

The simplest fixed effects specification is reported in column 2. The results indicate that when no condom is used, the price increases by 13.1%. This estimate is about a third higher than the random effects estimate.

Some other coefficients of interest from this specification were in the categories of services provided and client characteristics. Clients paid more for the services of oral sex and stripping. The wealthier the client, the more he pays. There appears to be a discount for ugly men! Ugly clients pay 3 % less. Contact made on the street or at a bar is more likely to command a higher price than contact made in massage parlors, escort services, hotels, and/or brothels. However, almost all sex workers' primary work locations are in brothels or bars where the establishment takes a cut. This coefficient picks up the fact that these sex workers are meeting some clients outside of their work establishment and not having to pay the middle man.

One concern is that sex workers who always use condoms and those that never use condoms may have different risk preferences and attract different types of clients along some unobservable dimensions than sex workers who sometimes use condoms. In order to check the robustness of this specification, we run the same model excluding those sex workers who always use condoms, those sex workers who never use condoms, and both those who never and always use condoms. As indicated by columns three, four and five of Table 6, the results do not change significantly.

In Table 7, we disaggregate non-condom use and condom use according to who suggested it. The results of Model 2 indicate that when the client requests non-condom use, there is a risk premium associated with non-condom use. He is willing to pay 23.1% more for non-condom use. The situation is reversed when the sex worker suggests non-condom use. In this case, the transaction price is discounted 20.1%. Another interesting result in this model is that when the client expresses a preference for condom use, the price is significantly higher than if the sex worker were to suggest condom use. Here the

client is probably worried about infection and obtains utility from condom use. Our model predicts that in this case, the client will be charged a premium for condom use, and in fact, the estimation results indicate an 8% premium. The default category in Model 2 is sex worker suggested condom use. Since the variable, "non-condom use because there was not one available" is not significant in Model 2, we restrict this variable to zero in Models 3-5.

In Model 4 of Table 7 we include some risk perceptions and bargaining power measures of the sex worker. We interact how attractive the sex worker is, whether she has experienced STI/vaginal problems, and whether she has secondary school or more education with the variable, "client suggested non-condom use". We assume that measures of her attractiveness and her educational background should directly affect her bargaining power. The more attractive or educated the sex worker, the higher the price she should be able to command. We use her STI/vaginal problem background as a measure of her own level of risk perception. We find that sex workers who are attractive get a 50% premium for non-condom use. Commercial sex workers who had a previous STI or vaginal problems get a 10% premium for non-condom use. Surprisingly, the sex worker's educational background interacted with non-condom use does not influence the price of the transaction. In Model 5 (Table 7), we interact various client characteristics such as his wealth level, his appearance, and whether he had drunk alcohol with the variable, "client suggested non-condom use". None of these interactions bear any significant results.

6. CONCLUSIONS

We find that commercial sex workers in Mexico are responding rationally to financial incentives. There is strong evidence that commercial sex workers are willing to assume the risks associated with providing unprotected sex for a 23% higher price. This premium increased to 47% if the sex worker was considered very attractive, a clear indication of her bargaining power. These findings suggest that simply educating sex workers and/or supplying more condoms at sexual network sites may not be sufficient to effectively reduce the transmission of HIV/AIDS/STIs. Other policy options need to be explored. For example, to increase condom use in commercial sex, client side interventions that reduce the demand for unprotected sex may be necessary. These client-based interventions are likely to be more difficult and expensive to implement than strictly supply side interventions. However, it is essential that further research in this area be carried out if the goal of reducing the spread of HIV/AIDS/STIs through commercial sex is to be achieved. The time has come to better understand this sector of the labor market for both health and economic rationale. It is a substantial portion of many local economies throughout the world and has the potential to impact the health and well-being of many. Since the sex sector is not likely to decline substantially while the economic and social foundations remain strong, understanding this sector could result in greater welfare-enhancing policies for all.

References

Ahlburg, D. and E. Jensen. (1998) "The Economics of the Commercial Sex Industry", *Confronting AIDS: Evidence from the Developing World.* European Commission.

Bronfman, M, R. Leyva Flores, M. Negroni. (2002) "Mobile Populations and HIV/AIDS in Central America, Mexico, and the United States", *Poblaciones Moviles y VIH/SIDA en Centroamerica, Mexico, y Estado Unidos*. Article prepared for the VIV International Conference of AIDS, Barcelona, Spain.

Cruz C., Hernandez-Tepichin, S. A. Griselda, Z.P. Uribe, X. Teran, CH.C. del Rio. (1996) "STDs and HIV prevalence in Female Sex Workers (FSW) in Mexico City"

XI International Conference on AIDS July 7-12, CONASIDA (National AIDS Council), Mexico.

Cuadra, S.M., R. Leyva, D. Hernandez-Rosete, and M. Bronfman. (2002) "The Regulation of STI/HIV/AIDS Control among Sex Workers in Two Cites Along the Southern Border of Mexico," *Poblaciones Moviles y VIH/SIDA en Centroamerica, Mexico, y Estado Unidos*. Article prepared for the VIV International Conference of AIDS, Barcelona, Spain.

Edlund, L. and E. Korn. (2002) "A Theory of Prostitution," *Journal of Political Economy*, Vol. 110. No. 1, pp 181-214.

Garen, John E. (1988) "Compensating Wage Differentials and the Endogeneity of Job Riskiness," *Review of Economics and Statistics,* Vol. 70, Pp: 9-16, February.

Hwang, Hae-Shin, W. Robert Reed and Carlton Hubbard. (1992) "Compensating Wage Differentials and Unobserved Productivity," *Journal of Political Economy*,Vol.100, No.4.

Karim Q., Karim S., Soldan K., Zondi M. (1995) Reducing the risk of HIV infection among South African sex workers: socioeconomic and gender barriers. *American Journal of Public Health.* Nov;85(11):1521-5.

Negroni, M., S. Bassett, G Vargas, C. Maehuali, S. Weir, and M. Bronfman. (2002) "Reaching Mobile Populations for AIDS Prevention in Southern Mexico Border Towns", *Poblaciones Moviles y VIH/SIDA en Centroamerica, Mexico, y Estado Unidos*. Article prepared for the VIV International Conference of AIDS, Barcelona, Spain.

Nieto M. (2002) Seminario de Derecho Constitucional. Celaya, Guanajuato, Mexico:Universidsd Latina de Mexico, April.

Pavía, N.R, R.A. Góngora-Biachi, L. Vera-Gamboa, P. González-Martínez, J. Flores-Abuxapqui, W. Moguel-Rodríguez, D. Lara-Pereda, G. Alonso-Salomón. (2002) "Knowledge and Behavior Towards HIV infection and its prevalence among female sex workers in Yucatan, Mexico", Article prepared for the XIV International Conference of AIDS, Barcelona, Spain.

Rao, V, I. Gupta, M. Lokshin, S. Jana (2002) "Sex Workers and the Cost of Safe Sex:The Compensating Differential for Condom Use in Calcutta", Forthcoming in the *Journal of Development Economics.*

Rosen, Sherwin. (1986) "The Theory of Equalizing Differences," Chapter 12 in *Handbook of Labor Economics*, Vol. 1, Orley Ashenfelter and Richard Layard (ed.), North-Holland – Elsevier, Amsterdam.

Siebert,W.S., Wei,X. (1998) Wage Compensation for Job Risk: The Case of Hong Kong. *Asian Economic Journal.* June; 12(2): 171-81.

UNAIDS (2002) *Report on the Global HIV/AIDS Epidemic*, UNAIDS, Geneva.

Valin, J. and L. Egremy. (2002) "Investigation-Action project for STI/HIV/AIDS Prevention in the South Frontier of Chiapas, Mexico", Article prepared for the XIV International Conference of AIDS, Barcelona, Spain.

Viscusi, K. (1992) Evidence on the Value of Life: Case Studies from the Labor Market. *Fatal Tradeoffs*. Chapter 3. Oxford University Press: New York.

Viscusi, K., Vernon, J., and J. Harrington (2000) Product Safety. *Economics of Regulation and Antitrust*. Chapter 22. MIT Press:Boston.

World Bank (1999) *Confronting AIDS: Public Priorities in a Global Epidemic*. Oxford University Press:Washington D.C.

Table 1. HIV Prevalence (Per Hundred) Amongst Adults, Pregnant Women & Sex Workers

Country	Adult	Pregnant Women	Sex Workers
Benin	1.2	0.4	53.3
Burkina Faso	6.7	12.0	60.4
Cameroon	3.0	1.9	21.2
Central African Rep.	5.8	10.0	17.0
Congo D.R.	3.7	4.6	30.3
Congo, Rep	7.2	7.1	49.2
Ivory Coast	6.8	11.6	67.6
Ethiopia	2.5	4.9	67.5
Gambia	2.1	1.7	34.7
Ghana	2.3	2.2	30.8
Guinea	0.6	0.7	36.6
Kenya	8.3	13.7	85.5
Malawi	13.6	32.8	78.0
Mali	1.3	3.5	55.5
Nigeria	2.2	3.8	22.5
Rwanda	7.2	25.3	87.9
South Africa	3.2	10.4	3.2
Sudan	1.0	3.0	7.6
Uganda	14.5	21.2	86.0
Zimbabwe	17.4	35.2	86.0
Argentina	0.4	2.8	4.2
Bolivia	0.1	0.0	0.0
Brazil	0.7	1.7	11.2
Dominican Republic	1.0	2.8	7.0
Ecuador	0.3	0.3	0.0
El Salvador	0.6	0.0	2.0
Guatemala	0.4	0.0	0.2
Guyana	1.3	6.9	25.0
Haiti	4.4	8.4	41.9
Honduras	1.6	1.0	20.5
Jamaica	0.9	0.7	24.6
Mexico	0.4	0.0	0.1
Panama	0.6	0.3	0.0
Paraguay	0.1	0.0	0.1
Trinidad and Tobago	0.9	0.3	13.0
Cambodia	1.9	3.2	43.0
China	0.0	0.0	0.3
India	0.4	0.3	51.0
Indonesia	0.05	0.0	0.3
Myanmar	1.5	1.3	18.2
Nepal	0.05	0.0	0.9
Thailand	2.1	2.4	18.8
Vietnam	0.07	0.0	0.24
Morocco	0.04	0.2	7.1

Source: World Bank (1999). *Confronting AIDS: Public Priorities in a Global Epidemic.*Oxford University Press.

Table 2. Sex Worker Characteristics (N=1034)

Characteristics	Mean	St. Dev
Age	27.82	7.77
Age of first sexual experience	15.65	2.36
Years in sex work	6.04	6.83
Have had STIs/vaginal problems (=1)	0.17	
Sex Worker is Very Attractive (=1)	0.21	
Have Children (=1)	0.62	
Education		
Ever gone to school (=1)	0.84	
Some secondary school or more (=1)	0.36	
Civil Status		
Single (=1)	0.41	
Married or in Partnership (=1)	0.22	
Divorced or Widowed (=1)	0.38	
Primary Work Site		
Bar/Club (=1)	0.82	
Street (=1)	0.12	
Other (=1)	0.06	

Table 3. Client Characteristics Reported By Sex Worker (N=3837)

	Mean	Std. Dev.
Regular Client (=1)	0.64	
Age	36.04	11.01
Nice or Pleasant Personality (=1)	0.66	
Wealth		
Poor (=1)	0.17	
Average Wealth (=1)	0.70	
Above Average Wealth (=1)	0.08	
Attractiveness		
Handsome (=1)	0.10	
Average (=1)	0.66	
Ugly (=1)	0.24	
Very Wealthy (=1)	0.05	
Cleanliness		
Dirty (=1)	0.10	
Clean (=1)	0.73	
Very Clean (=1)	0.17	

Table 4. Transaction Characteristics (N=3837)

Characteristics	Mean	SD	Min	Max
Transaction Price (Mexican Pesos)	446.87	427.24	20	5,800
Condom Used (=1)	0.90			
Services Provided*				
Vaginal Sex (=1)	0.97			
Oral Sex (=1)	0.03			
Dance (=1)	0.06			
Strip (=1)	0.03			
Talk (=1)	0.15			
Other (=1)	0.02			
Sustenance Use & Abuse				
Client Had Drunk Alcohol (=1)	0.80			
Client Had Taken Drugs (=1)	0.04			
Sex Worker had Drunk Alcohol (=1)	0.72			
Sex Worker Had Taken Drugs (=1)	0.04			
Client Abused/Hit Sex Worker (=1)	0.02			

*In some cases, more than one service per transaction was provided.

Table 5. "Who" Suggested Condom Use/Non Use:
A Measure of Relative Risk Perceptions

Condoms Used		Condoms Not Used		
Client Suggested	CSW Suggested	Client Suggested	CSW Suggested	Did not have one
151	3237	218	50	55
(4.5)	(95.5)	(67.5)	(15.5)	(17.0)

Table 6. Basic Log Price Fixed Effects Regressions

Independent Variables	Whole Sample		Exclude CSWs Who Never Use Condoms	Exclude CSWs Who Always Use Condoms	Exclude Always & Never Condom Users
	Random Effects	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects
Condom Use					
No Condom Used	0.093 (3.91)***	0.131 (5.49)***	0.132 (5.52)***	0.133 (4.19)***	0.135 (4.19)***
Services Provided by CSW					
Talked with Client	0.001 (0.58)	0.001 (0.48)	0.001 (0.48)	0.002 (0.56)	0.002 (0.56)
Vaginal Sex	-0.051 (1.07)	-0.067 (1.45)	-0.069 (1.50)	0.002 (0.56)	-0.008 (0.08)
Oral Sex	0.185 (6.12)***	0.149 (5.10)***	0.150 (5.10)***	0.117 (1.83)	0.121 (1.87)*
Danced with Client	0.065 (1.28)	-0.021 (0.34)	-0.034 (0.55)	0.061 (0.57)	0.043 (0.38)
Stripped for Client	0.406 (8.14)***	0.240 (4.68)***	0.239 (4.66)***	0.170 (1.04)	0.184 (1.11)
Client Characteristics					
Regular Client	0.004 (0.24)	0.018 (1.11)	0.020 (1.22)	0.076 (2.21)**	0.086 (2.38)***
Clients' Age	0.000 (0.83)	0.001 (1.80)*	0.001 (1.81)*	0.001 (0.76)	0.001 (0.74)
Client was Not Poor	0.109 (5.82)***	0.065 (3.49)***	0.069 (3.63)***	0.113 (2.97)***	0.126 (3.15)***
Client was Wealthy	0.232 (8.46)***	0.146 (5.34)***	0.147 (5.35)***	0.192 (3.08)***	0.195 (3.05)***
Client was Very Wealthy	0.323 (10.06)***	0.257 (8.12)***	0.264 (8.15)***	0.282 (4.90)***	0.296 (4.84)***
Client was nice	0.030 (1.71)*	-0.018 (0.99)	-0.017 (0.88)	0.002 (0.06)	0.008 (0.21)
Client was Dirty	0.007 (0.36)	0.022 (1.09)	0.017 (0.86)	0.024 (0.54)	0.009 (0.19)
Client was Very Clean	0.018 (0.67)	0.007 (0.25)	0.002 (0.08)	-0.021 (0.41)	-0.033 (0.61)
Client was Ugly	-0.044 (2.70)***	-0.030 (1.88)*	-0.031 (1.89)*	-0.023 (0.63)	-0.029 (0.74)
Client was Handsome	-0.015 (0.80)	-0.032 (1.69)*	-0.035 (1.82)*	-0.065 (1.61)	-0.077 (1.84)*
Met client at a bar\club	0.372 (5.52)***	0.186 (1.84)*	0.178 (1.75)*	0.381 (2.12)**	0.362 (1.95)*
Met client on the street	0.017 (0.23)	0.336 (3.11)***	0.342 (3.14)***	0.605 (3.12)***	0.634 (3.13)***

Notes: This table reports the coefficients and t-statistics for regression models where the dependent variables is the log of the price charged the client by the sex worker. * significant at 10%; ** significant at 5%; ***significant at 1%

Table 6. Basic Log Price Fixed Effects Regressions (Continued)

Independent Variables	Whole Sample		Exclude CSWs Who Never Use Condoms	Exclude CSWs Who Always Use Condoms	Exclude Both Always & Never Condom Users
	Random Effects	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects
Other Activities					
Client abused CSW	0.010 (0.26)	0.027 (0.69)	0.028 (0.73)	0.087 (1.17)	0.096 (1.27)
Client drank alcohol	0.044 (1.89)*	-0.057 (2.40)**	-0.059 (2.49)**	-0.098 (2.01)**	-0.106 (2.09)**
Client took drugs	0.021 (0.79)	0.034 (1.34)	0.034 (1.29)	0.073 (1.49)*	0.074 (1.45)
CSW drank alcohol	0.102 (4.59)***	0.018 (0.79)	0.019 (0.81)	0.042 (0.67)	0.042 (0.65)
CSW took drugs	0.080 (2.40)**	0.047 (1.43)	0.040 (1.20)	0.034 (0.51)	0.011 (0.17)
Summary Statistics					
Within R^2	0.054	0.079	0.080	0.094	0.100
Hausman Test (Chi 2)	496.51***				
F Statistic for joint significance of CSW FEs		27.86***	27.72***	16.09**	15.36**
Number of Observations	3,837	3,837	3,753	1,309	1,225
Number of CSWs	1,029	1,029	1,007	363	341

Notes: This table reports the coefficients and t-statistics for regression models where the dependent variables is the log of the price charged the client by the sex worker. * significant at 10%; ** significant at 5%; ***significant at 1

Table 7. Log Price Fixed Effects Regressions With Risk and Bargaining Power Interactions (N=3,837)

	Model 1	Model 2	Model 3	Model 4	Model 5
Condom Use					
No Condom Used	0.131 (5.49)***				
Non-Condom Use - Client Suggested		0.231 (8.35)***	0.234 (8.52)***	0.237 (7.39)***	0.296 (3.98)***
Non-Condom Use - CSW Suggested		-0.201 (2.57)**	-0.197 (2.52)**	-0.208 (2.67)***	-0.194 (2.48)**
Non-Condom Use – did not have one available		-0.044 (0.95)			
Client Suggested Condom Use		0.077 (1.74)*	0.082 (1.86)*	0.082 (1.87)*	0.078 (1.78)*
CSW Risk Perceptions and Bargaining Power					
(CSW is attractive) × (client suggested non-condom use)				0.234 (2.84)***	0.243 (2.92)***
(CSW had STD/vaginal problems) × (client suggested non-condom use)				-0.140 (2.10)**	-0.148 (2.18)**
(CSW has some secondary school) × (client suggested non-condom use)				-0.096 (0.38)	-0.130 (0.49)
Client Characteristic Interactions					
(Client is of average wealth) × (client suggested non-condom use)					-0.097 (1.59)
(Client is wealthy) × (client suggested non-condom use)					0.040 (0.40)
(Client is very wealthy) × (client suggested non-condom use)					0.002 (0.03)
(Client is ugly) × (client suggested non-condom use)					0.082 (1.67)*
(Client was drunk) × (client suggested non-condom use)					-0.019 (0.34)
Within R^2	0.079	0.096	0.095	0.010	0.102
F Statistic for joint significance of the CSW fixed effects	27.86***	28.37***	28.37***	28.47***	28.24***

Notes: This table reports the coefficients and t-statistics for fixed effects regression models where the dependent variables is the log of the price charged the client by the sex worker. Included in the regressions, but not reported are all of the independent variables included in the models reported in Table 7. * significant at 10%; ** significant at 5%; ***significant at 1%.

Figure 1: Condom Use By Sex Workers With Last 3 Clients

Percent of Sex Workers

- No Condom Used With Any Client: 4.6%
- Condom Used With Some Clients: 11.7%
- Condom Used With All Clients: 83.7%