

# **Risky Business: The Market for Unprotected Commercial Sex<sup>1</sup>**

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**Abstract:** Each day close to 20,000 people become infected with the HIV virus worldwide; a large portion of whom are infected through unprotected sex with 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 some sex workers are willing to take the risk because clients are willing to pay more to avoid using condoms. Using a panel data set from Mexico, we estimate that sex workers received a 23 percent premium for unprotected sex from clients who requested not to use a condom. However, this premium jumped to 46 percent if the sex worker was considered very attractive. These results suggest that the current policies aimed at educating sex workers about risk, empowering them and improving their access to condoms need to be complemented with interventions aimed at teaching clients about the “joy of safe sex”, thereby increasing the demand for using condoms.

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Each day over 20,000 people become infected with the HIV virus worldwide; a large proportion of whom are infected through unprotected sex with sex workers (UNAIDS, 2002). Although condoms are an effective defense against the transmission of HIV and other sexually transmitted infections (STIs) and there has been substantial education of sex workers regarding the risk of infection, large numbers of sex workers are not using condoms with their clients (UNAIDS, 2002). Indeed, infection rates among sex workers are among the highest of any group, especially in countries with widely disseminated epidemics (Table 1). A major question confronting policy makers who design and implement AIDS prevention interventions are “why do sex workers risk infection 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).

Ignorance does exist and the forced exploitation of commercial sex workers does occur. However, another possible explanation is that sex workers are willing to risk infection by not using condoms with clients if they are adequately compensated. Indeed, economic theory has long posited the general principle of compensating wage differentials (e.g. Rosen, 1986), and a number of authors have documented wage differentials that compensate for risky work activities in other labor sectors (e.g. Viscusi 1992, Siebert and Wei 1998). Similarly, automobiles with anti-lock brakes, homes with fire sprinklers 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).

Understanding why sex workers do not use condoms is critical for the development of policy that is effective in increasing condom use and consequently in reducing the transmission of HIV and other sexually transmitted infections. The usual policy recommendations are to intervene on the supply side of

commercial sex (World Bank, 1999). These supply side policies include (1) educating sex workers about the risks, (2) increasing access to inexpensive condoms, (3) reducing environmental barriers to condom use by working with gatekeepers such as brothel owners and the police, and (4) empowering sex workers by, for example, improving their negotiating skills, fostering self-help organizations and improving access to credit. Additionally, governments are urged to implement and enforce laws against human trafficking, rape, assault, and indentured servitude.

However, when some clients are willing to pay substantially larger sums for unprotected sex, supply side intervention alone are less likely 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, however, 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. Similarly, when the sex worker prefers not to use a condom, the client is given a discount for not using a condom.

We test these predictions using a data set that we recently collected in Mexico. We estimate that sex workers received a 23 percent premium for unprotected sex from clients who requested not to use a condom, and this premium jumped to 46 percent if the sex worker was considered very attractive. We

also found that clients who requested condom use paid 8 percent more for protected sex, and sex workers that requested not to use a condom gave clients a 20 percent discount.

An issue for the analysis is that condom use may not be exogenous 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. For example, if better educated 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 were, say, 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.

In order to control for the endogeneity 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 a model with sex worker fixed effect to control for possible bias from both unobserved sex worker heterogeneity and client selection.

While there is anecdotal evidence that sex workers charge more for sex without a condom (Ahlburg and Jensen, 1998), there has been little published work that has tried to test this claim. The one exception, to our knowledge, is Rao *et al* (2002) who report that Indian sex workers who use always use condoms earn 66 percent less than those who do not always use condoms. However, they did not have the data to distinguish between 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 that was used as an instrument was intended to increase condom use by changing knowledge about risks and risk preferences, and possibly by changing bargaining power. As we show in the theoretical model, risk preferences and bargaining power affect the price levels as well as the price differential.

## 1. MARKET DESCRIPTION

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 substantial product heterogeneity. Sex workers differ in their physical and personality characteristics and in the services that they are willing to provide. Clients' tastes for sex worker characteristics are also highly heterogeneous and are attracted to specific sex workers based on the sex workers' characteristics and the particular services they are willing to provide. This means that other sex workers are *ex ante* inferior in their eyes. Clients also face substantial search costs not only in terms of time and money, but also in terms of psychological costs from possible embarrassment. Clients search for sex workers in specific locations such as in the streets, brothels, massage parlors, bars, classified advertisements, and on the Internet. 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. The client and sex worker (or her agent) then negotiate over price and services including whether a condom will be used. Client heterogeneity in tastes for sex worker characteristics and the high search costs allow sex workers to charge different prices to different clients. The sex worker collects information about the client from his appearance and from conversation in order to establish his approximate willingness to pay. She will use signals such as his clothes, the car he drives, his level of cleanliness, his communication style, and many

other signals to determine an asking price. Sex workers or their agents seem to usually start the negotiation.

The timing of negotiation is very heterogeneous. However, interviews with sex workers suggest that while initial terms are almost always negotiated up front, the terms are typically renegotiated again later as client preferences are typically revealed over time. In some locations an intermediary such as her manager or the owner of the brothel or massage parlor may conduct the initial negotiation. However, in the population surveyed terms are regularly renegotiated directly with the sex worker in the room because the client might ask for more or different services.

Condom use is almost always negotiated directly between the client and the sex worker. While condom use amongst sex workers in Mexico is relatively high (Negroni et al, 2002)<sup>5</sup>, there is also substantial heterogeneity in preferences over condom use. Many clients report that they prefer not to use condoms because it enhances pleasure and they do not believe the risk of infection is high, while others said they were indifferent, and some said that they insist on using condoms because of the risk of infection. Similarly, most sex workers reported that they always use condoms, yet a number indicated that they prefer not to use condoms for comfort reasons and because they also believe that the risk of infection is low.

## 1.1 Pretty Woman

Our view of how the market works is consistent the popular view of the sex market. In the movie *Pretty Women*, Richard Gere searches for Julia Roberts on the street and based on her appearance, invites her back to her hotel. Here is the text from the scene in which they negotiate for a week of her time:

*Richard Gere:* Vivian, I have a business proposition for you.

*Julia Roberts:* What do you want?

*Richard Gere:* I'm going to be in town until Sunday. I'd like for you to spend the week with me.

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<sup>5</sup> In a study of female sex workers in Chiapas, condom use frequency was reported to be 55% (Valin and Egremy 2002). In our data from Michoacan and Morelos, described below, 84 percent of the sex workers reported using condoms in each of their last three sexual transactions.

*Julia Roberts:* Me?

*Richard Gere:* 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.

*Julia Roberts:* 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.

*Richard Gere:* I want a professional. I don't need any romantic hassles this week.

*Julia Roberts:* If you're talkin' 24 hours a day, it's gonna cost you.

*Richard Gere:* Oh, yes, of course. All right, here we go. Give me a ballpark figure. How much?

*Julia Roberts:* Six full nights, days too. Four thousand.

*Richard Gere:* Six nights at 300 is 1800.

*Julia Roberts:* You want days too.

*Richard Gere:* Two thousand.

*Julia Roberts:* Three thousand.

*Richard Gere:* Done.

*Julia Roberts:* Holy Shit!

*Richard Gere:* Vivian, is that a yes?

*Julia Roberts:* Yes! Yes!

Sometime later as Julia Roberts is leaving to go shopping:

*Julia Roberts:* This is such a great gig. I would've done it for two thousand

*Richard Gere:* I agree. I would've paid four. 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 \$2,000. 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.

## **1.2 Risk of HIV and other STIs in Mexico**

In fact, the risk of HIV infection in Mexico is very low. According to the National AIDS Program (UNAIDS/WHO Working Group, 2000), less than 1 percent of sex workers and less than 1

percent of the adult population is infected with HIV (Table 1).<sup>6</sup> Moreover, the probability of transmission of infection to a woman from a single act of penetrative sex with an infected male partner is less than 1 percent and the probability of transmission to a man from penetrative sex with an infected woman is less than 0.1 percent (Gray et al, 2001).

One reason why the infection rates are so low is that commercial sex work is regulated in many Mexican states and massive education campaigns for sex workers have been conducted over the last ten years. The regulation typically includes periodic medical screening to detect HIV and other STIs as well as periodic inspections of work sites by government agencies (Cuadra et al, 2002). While the risk of HIV infection is low, the risk of other STIs is much higher. In fact, in our sample, 17 percent of sex workers reported having an STI or vaginal infection in the last year.<sup>7</sup>

In the focus groups, both sex workers and clients reported that they had some awareness of the risk of HIV and other STIs. However, both groups reported that their risk perceptions did not change based on the characteristics of the specific partner including his/her preferences over condom use. This implies that client risk perceptions are not conditional on the characteristics of the sex worker including whether the sex worker prefers to use a condom or not, and sex workers risk perceptions are not conditional on the characteristics of clients including their condom preferences. The only reported exception was when the client was a regular customer. In this case, both client and sex worker reported lower perceived risk.

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<sup>6</sup> Other studies confirm this fact. Pavia et al (2002) finds that the HIV infection prevalence is 1 percent among female sex workers in the Yucatan. Another study of female sex workers in Mexico City reports an HIV prevalence of 0.14% (Cruz et al 1996).

<sup>7</sup> From our in-depth interviews and focus groups, we also believe that the self-reporting of STIs during the questionnaire application was underreported. This is because bars/clubs that are located in states where sex work regulations will not allow a sex worker to work if she suffers from a STI. Therefore, since these women fear losing their job, they may well underreport STIs/vaginal problems.

## 2. A BARGAINING MODEL OF COMMERCIAL SEX TRANSACTIONS

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

### 2.1. 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  $\beta$ . His disutility from condom use,  $\beta$ , 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 Richard's payoff from the next best alternative use of his time to be zero. Richard's disutility from using a condom need not be positive. Indeed, if Richard prefers not to risk infection and therefore prefers to use a condom, then his  $\beta$  is negative.

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  $\gamma$  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 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. Here too we don't assume that  $\gamma$  is necessarily positive; if Julia prefers to supply sex without a condom her disutility associated with not using a condom would be negative.

### 2.2. 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 ( $W + \gamma$ ).

### 2.3. Condom Use

Since this is a model of free choice, Julia will supply unprotected sex only if both agree not to 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,  $\beta$ . For Julia, this implies that her marginal revenue from not using a condom ( $P^{nc} - P^c$ ) is greater than or equal to her disutility from risking infection by not using a condom,  $\gamma$ . 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<sup>8</sup>.

### 2.4. 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

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

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

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<sup>8</sup> One can easily confirm that both Richard's and Julia's equilibrium payoff functions are higher for unprotected sex than for protected sex when  $\beta > \gamma$  by substituting the formulas for the equilibrium prices in (1) and (2) from section D into the respective payoff functions and solving.

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

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, both bounded by his maximum willingness to pay for protected sex. The more Richard dislikes using a condom, the lower the price, bounded by her minimum willingness to accept. The better Julia's outside option, the higher the price. Finally, the greater Julia's bargaining 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:

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

The equilibrium price of unprotected sex is:

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

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 predictions from this result. The more Richard values unprotected sex with Julia, the higher the price will be. 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.

## 2.5. Price Differential for Unprotected Sex

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

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

Equation (3) compares the price Richard pays for unprotected sex to the counterfactual of what he would have paid had they used a condom. 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's 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 he would have for non-condom use. This can occur two ways. First, suppose that Richard is concerned about the risk of infection and gains utility from condom use. If his bargaining power weighted utility of condom use is greater than Julia's bargaining power weighted utility of condom use, then he will pay her more to use a condom. In this case  $\beta$  is negative and large enough so that (3) becomes negative. This result just says that if Richard wants to use a condom more than Julia, he will pay her to do so. Alternatively, Julia may prefer to take the risk. If she prefers to not to a use condom more than Richard prefers not to use a condom, then she will pay him for more unprotected sex. In this case,  $\gamma$  is negative and large enough so that (3) becomes negative.

### 3. IDENTIFICATION AND ESTIMATION

Our empirical objectives are to get consistent estimates of the price differential between condom and non-condom use, and how this differential varies with client and sex worker preferences. To get an estimable model we combine the expressions for  $P^{nc}$  and  $P^c$  from equations (1) and (2) into the following single equation:

$$P_{ij} = (1 - \alpha)V_{ij} + \alpha(W_j + \gamma_j) - [(1 - \alpha)\beta_i + \alpha\gamma_j]C_{ij} \quad (4)$$

where subscript  $i$  denotes the client,  $j$  the sex worker, and  $C_{ij}$  indicates whether the sex worker used a condom with the client (=1).

We specify the first term on the right hand side of equation (4), i.e. client  $i$ 's bargaining power weighted value of having unprotected sex with worker  $j$ , to be

$$(1 - \alpha)V_{ij} = \lambda + \sum_k \phi_k X_{ik} + \sum_l \delta_l S_{ijl} + \psi_j + \varepsilon_{ij}$$

(5)

where the  $S_{ijl}$  are the services that the sex worker provided to the client, the  $X_{ik}$  are characteristics of the clients,  $\psi_j$  is a sex worker fixed effect, and  $\varepsilon_{ij}$  is a zero mean random disturbance. The expression allows the maximum a client is willing to pay to differ by his characteristics (e.g. such as wealth, education, whether he has been drinking), the services provided (e.g. vaginal versus oral sex), and sex worker characteristics (e.g. physical attractiveness).

We then substitute equation (5) into equation (4), to get:

$$P_{ij} = \lambda + \sum_k \phi_k X_{ik} + \sum_l \delta_l S_{ijl} + \rho(\beta_i, \gamma_j) C_{ij} + \theta_j + \varepsilon_{ij} \quad (6)$$

where:

$$\rho(\beta_i, \gamma_j) = -[(1 - \alpha)\beta_i + \alpha\gamma_j] \quad (7)$$

$$\theta_j = \psi_j + \alpha(W_j + \gamma_j) \quad (8)$$

The price equation in expression (6) along with the following condition for condom use,

$$C_{ij} = 1 \text{ if } \beta_i \leq \gamma_j \text{ and } C_{ij} = 0 \text{ otherwise,} \quad (9)$$

form our empirical model. Equations (6) and (9) describe the joint determination of price and condom use.

Our objective is to estimate the price differential,  $\rho(\beta_i, \gamma_j)$  between condom and non-condom use. While we do not observe both condom and non-condom use in a single transaction, the price differential asks how much more the client paid for not using a condom to the counterfactual of what he would have paid had he used a condom, and vice versa.

One concern is that since the choice to use a condom use is endogenous, condom use may be correlated with the error term in the price equation (6) resulting in biased estimates. Indeed, condom use as indicated in equation (9), is both a function of the clients and the sex workers risk preferences,  $\beta$  and  $\gamma$  respectively. Sex worker condom preferences,  $\gamma$  enter the price equation both linearly and interacted with condom use and client condom preferences,  $\beta$  enter interacted with condom use. Since  $\gamma$  enters (6) as

part of the error, condom use will be correlated with the error term in the price equation. Moreover, if client preferences,  $\beta$ , are measured with error, then condom use may also be correlated with the error term in the price equation.

A common approach to dealing with such endogeneity is to use instrumental variables. However in principle, there are no omitted variables that could be used as instruments for condom use in the price equation. Condom use is only a function of  $\beta$  and  $\gamma$ , and both of these are directly included in the price equation.<sup>9</sup>

Instead we will take advantage of the fact that we have transaction data and multiple transactions for each sex worker by including a sex worker fixed effect. The sex worker fixed effect specified in equation (6) not only controls for  $\gamma$ , but also for the value of the sex worker's outside option and the fixed effect from the clients' value function in equation (5),  $\psi_j$ . The fixed effect controls for bias from both unobserved sex worker heterogeneity and client selection based on unobserved sex worker characteristics.

While the sex worker fixed effect controls for  $\gamma$ , we still need to include measures of  $\beta$  interacted with condom use. We measure four preference states using information on who suggested using the condom (client versus sex worker,) if a condom was used, and who suggested not using a condom if no condom was used. There are four cases:

1. The default case is when a condom was used and condom use was suggested by the sex worker. This is the case where the client's maximum willingness to pay not to use a condom is less than the minimum amount the sex worker has to be compensated not to use a condom.
2. The case in which a condom was not used and the client suggested no condom use reflects client's who are willing to pay more for not using a condom than the minimum that the sex worker needs to be compensated to take the risk. Here we expect the price to be higher than the default case.

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<sup>9</sup> One possibility is to use the price of condoms as an instrument. However, the price of condom use is subsumed in the price of the transaction and if it were broken out would be part of the price differential. Moreover, the condom price is a very small fraction of the total transaction price and there is very little cross-section variation in condom prices.

3. On the other hand, if no condom was used because the sex worker suggested not using one, then the sex worker's willingness to pay to not use a condom is larger than the client's willingness to pay and the price should be lower than the default case.
4. Finally, if a condom was used because the client suggested it, then the price should be higher than the default case because the client's willingness to pay to use a condom is larger than the sex worker's willingness to pay.

In fact, these four cases allow us to test the predictions of the theoretical models. While we try to directly measure  $\beta$  using the “who suggested condom and non-condom use” information, there still might there be unobserved portions of the  $\beta$  distribution that are salient in the price differential and a determinant of condom use. Such measurement error would lead to correlation between condom use and the error term in the price equation. We test the extent to which there might be measurement error by further interacting the “who suggested” variables with observed client characteristics that predict condom use. We do so by first estimating a random effects multinomial logit predicting who suggested condom/non-condom use as a function of sex worker and client characteristics. Those characteristics that significantly predict who suggested condom/non-condom use are correlated with  $\beta$  and  $\gamma$ . We then take those significant predictors and interact them with who suggested condom/non-condom use in the price equation. If the client interactions are not significant, this suggests that the “who suggested condom/non-condom use” variables capture the salient parts of the  $\beta$  distribution and that there are unlikely to be unmeasured portions of  $\beta$  in the error term that bias the estimates.

#### **4. THE SURVEY AND SAMPLE CHARACTERISTICS**

In the summer of 2001, in collaboration with Mexican National AIDS Program we conducted a survey of female sex workers (SW) in the Mexican States, Morelos and Michoacan. The project was initially designed to pilot a behavioral surveillance instrument and was entitled the *Second Generation HIV/AIDS Behavioral Surveillance Project*. We were able to add a module to the survey to capture additional

information on the SWs' socioeconomic characteristics and on the details of their last three transactions. Morelos borders Mexico City to the South and Michoacan is North-West of the City. Morelos has one of the highest rates of reported HIV/AIDS in the country, while Michoacan is closer to the median rate (CENSIDA, 2001). Selection of these two states was based on HIV/AIDS prevalence, previous experience with behavioral studies and willingness of the local AIDS Programs to collaborate. In this section, we describe the survey methods and measurement of key variables

#### **4.1. The Survey**

Once the geographic universe was defined, state-wide mapping exercises were conducted to identify the universe of sex workers. The mapping methodology was designed 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, i.e. as additional sex work sites are located, people in the new sites asked about the location of other sites. 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 home. The bias in favor of the more formal sites implies a likely bias in favor of sex workers that both have a larger number of clients and a larger proportion of non-regular clients.

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 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 1029 sex workers responded to the socioeconomic survey, about three quarters of whom were from Michoacan and one-quarter from Morelos. 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 Morelos for a total of 3,837 observations. For each transaction, we asked the price paid by the 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 Characteristics**

The sample of women who responded to the socioeconomic questionnaire is described in Table 2. The average sex worker is twenty-eight years old, had her first sexual experience at age sixteen, and her first compensated sex experience at twenty-two. 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. Eighty-four percent are literate, twenty-two percent are married, and sixty-two percent have children. 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.

The next five columns of Table 2 decompose sex worker characteristics by condom/non-condom use and who suggested it. While the number of observations report the number of sex workers who had at least one transaction in that category, the descriptive statistics are transaction-weighted. There are a number of interesting differences across the categories. In particular, sex workers that use condoms are more literate, less likely to have had a sexually transmitted infection or vaginal problem, and more attractive than sex workers who provide unprotected services.

### 4.3. Transaction and Client Characteristics

Table 3 provides a description of the transactions as reported by the sex worker. The first column reports the descriptive statistics for the whole sample. The next columns disaggregate the data by who suggested using and not using a condom, which are our measures of risk preference. 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. Similarly, if the sex worker suggested not using a condom, we take this to mean that she is less risk adverse than him.

While a condom was used in approximately 90 percent of the transactions, the client suggested condom use about 5 percent of the time. This provides 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 and unsurprisingly, when a condom was not used, it was because the client suggested non-use 66% of the time. However, in 16 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, or desire to become pregnant). More interestingly, condoms were not used because of supply constraints in only 18 percent of the cases, suggesting that supply constraints were not a big problem.

The overall average price per act was 447 Mexican Pesos (about 45 US Dollars). The minimum price in the sample was 20 Pesos and the maximum was 5,800 Pesos. Therefore, the price range for services is quite large. Table 3 also provides the mean transaction price depending on who suggested condom/non-condom use.

Almost all transactions included vaginal sex regardless of condom use. Other services such as oral sex, dancing and stripping were provided in less than ten percent of all transactions. The average client was estimated to be thirty-four years old and about fifty-five percent of the clients were regular customers. Interestingly, when the sex worker suggested non-condom use, eighty percent of those clients

were regulars indicating that sex workers are more willing to suggest non-condom use when they know the client. Fourteen percent of the clients were perceived to be very wealthy when sex workers suggested non-condom use. In other categories of condom/non-condom use, very wealthy clients range from only one to six percent. This suggests that the sex worker is more likely to suggest non-condom use when she believes that the client is very wealthy. The dirtier clients were also the clients who used condoms less. While most transactions included alcohol consumption by both parties, few involved drug use. There was very little reporting of clients physically abusing the sex worker in her last 3-4 transactions.

The key variable in the analysis is condom use. 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.

## 5. ESTIMATION RESULTS

We estimate equation (4) replacing  $P$  with  $\log P$  because the price distribution is skewed to the right.<sup>10</sup> The estimation results are presented in Table 4. In column one, we report the random effects estimation results and tests whether the random effects estimates are different than the fixed effects estimates using a Hausman test. The Hausman test overwhelmingly rejects random effects in favor of fixed effects.

The simplest fixed effects specification is reported in column two of Table 4 where we disaggregate non-condom use and condom use according to who suggested it. The default category is sex worker-suggested condom use. The results indicate that when no condom is used upon the clients' suggestion, the price differential is 23%. This estimate is about a third higher than the random effects

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<sup>10</sup> Equation (4) with  $\log P$  as the left hand side value can be explicitly derived from assuming that the utility functions are multiplicative rather than linear.

estimate. This finding supports our theoretical model, which predicts that in the case where the client suggests no condom use, we expect the price to be larger than the default case. This is reflective of clients who are willing to pay more for not using a condom than the minimum that the sex worker needs to be compensated to take the risk.

The situation is reversed when the sex worker suggests non-condom use. In this case, the transaction price is discounted 20%. Once again, this empirical finding supports the theoretical model, which predicts that the price should be lower than the default case. This is because the sex worker's willingness to pay to not use a condom is larger than that of the client's. Another interesting result of this specification 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.

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 marginal discount for ugly men as they pay 3% less! Contact made at a bar is more likely to command a higher price than contact made in massage parlors, escort services, hotels, and/or brothels. This coefficient may pick up the fact that these sex workers are meeting some clients outside of their work establishment and not having to pay the middleman. It may also reflect that more successful sex workers are more likely to be able to work independently than their less successful colleagues.

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 both those who never and always use condoms. As indicated by column three in Table 4, the results do not change in any significant manner. Since the variable, "non-condom use

because there was not one available” is not significant in any of these models, we restrict this variable to zero for the rest of the analysis.

## 6. ROBUSTNESS

Recall that one of our main concerns was that condom use is endogenous and determined by client and sex worker preferences,  $\beta$  and  $\gamma$  respectively. While sex worker fixed effects control for correlation with any omitted sex worker preferences, there may be correlation between condom use and omitted client preferences if  $\beta$  is measured with error. In this case, then condom use might be correlated with the error term in the price equation (6) resulting in biased estimates. In other words, there still might be unobserved portions of the  $\beta$  distribution that are salient for the price differential and determinants of condom use.

We attempted to directly measure risk preferences by using the variables on “who suggested condom/non-condom use”. If the sex worker suggested condom use, this implies she has a high  $\gamma$  and the client has a low  $\beta$ . If the client suggests condom use, then he has a negative  $\beta$ . If the client suggests non-condom use, then the client has a high  $\beta$ . Finally, if the sex worker suggests non-condom use, then both she and the client have very low  $\gamma$  and  $\beta$ , respectively.

If this technique does not completely measure the salient portion of  $\beta$ , then some of  $\beta$  that is correlated with condom use will be in the error term. We check for possible bias by further interacting who suggested condom use with observed client characteristics that are correlated with  $\beta$ . To identify client characteristics that are correlated with  $\beta$ , we estimate a random effects multinomial logit predicting who suggested condom/non-condom use as a function of sex worker and client characteristics. Those characteristics that significantly predict who suggested condom/non-condom use are correlated with  $\beta$  and  $\gamma$ .

Table 5 provides the results of this random effects multinomial logit condom choice regression where the options were sex worker suggested condom use (default), client suggested non-condom use, and client suggested condom use. We subsumed the non-condom use because one was not available into the default option of sex worker suggested condom use. There were too few observations in the “she suggested non-condom use” category, and therefore we omitted those observations and that category from the analysis. Characteristics that are significant determinants of “client suggested non-condom use” are his age and level of cleanliness as well as her literacy, attractiveness, and age at first sex. Characteristics that are significant determinants of “client suggested condom use” are whether the client has a nice personality and is handsome and the sex worker’s attractiveness, age, and age of first sex for money.

We then take those significant predictors and interact them with “who suggested condom/non-condom use” in the price equation. Table 6 reports the results of this estimation. While the estimation included all of the variables reported in Table 4, we report only the coefficients on who suggested condom and non-condom use and interactions. The first column reports the fixed effects regression results without any interactions for reference. The second column reports the results where the client and sex worker characteristics that were significant in the condom choice multinomial logit are interacted with “client suggested non-condom use” and “client suggested condom use”. The results indicate that client risk interactions are neither individually nor jointly significantly different from zero. This suggests that our estimations of the price differentials in Table 4 are less likely to be biased from unobserved portions of  $\beta$ .

While the interactions with client characteristics are insignificant, the interactions with some of the sex worker characteristics are significant. In model 3 in Table 6, we report the results for a model that excludes the interactions with client characteristics and the interactions with sex worker characteristics that were insignificant in model 2. In this case we find that the sex worker interaction of age of first compensated sex with “client suggested condom use” is no longer significant. Attractive interacted with

“client suggested not using a condom” is still significant. This suggests that clients who want to have unprotected sex with an attractive sex worker must pay a 46 percent premium.

## 7. CONCLUSIONS

We find that sex workers in Mexico are responding rationally to financial incentives. There is strong evidence that sex workers are willing to assume the risks associated with providing unprotected sex for a 23 percent higher price. This premium increased to 46 percent if the sex worker was considered very attractive, a clear indication of her bargaining power. However, clients who preferred condom use paid an 8 percent premium to use condoms and sex workers who did not want to use condoms had to reduce the price by 20 percent to compensate clients for taking the risk.

These findings suggest that the most effective interventions for reducing HIV/STI transmission through commercial sex will be those that target both the supply side (the sex workers and their agents) as well as the demand side (the clients) of the market.

Interventions to educate sex workers about the risks of unprotected sex serve to reduce the number of transactions in which a condom is not used. Interventions to empower sex workers or improve their negotiating skills serve to increase their bargaining power so that they are able to capture more of their clients' willingness to pay and improve their incomes (which can also increase their disutility from non-condom use, further reducing unprotected sex). Making condoms more available or available more cheaply serves to make non-condom use relatively more expensive. All three of these types of interventions would thus be expected to reduce unprotected sex and HIV transmission.

However, if despite an increase in the sex worker's disutility from non-condom use, clients are still willing to pay more than enough to compensate sex worker's for taking the risk (not unlikely if clients are on average wealthier than the sex workers they hire), then a significant amount of unprotected commercial sex will continue to occur, albeit at a higher price. This implies that efforts to reduce clients' disutility of condom use, by educating them about the risks of unsafe sex or marketing the “joy of safe

sex” to them may be as or more important than interventions designed to change sex worker’s disutility from non-condom use -- and that the relative importance of client-side interventions increases as the inequality in willingness to pay/accept between clients and sex workers increases. Unfortunately, because clients are both more numerous and are usually more difficult to target (especially in sex work sites because health educators who scare away clients are not especially welcome), targeting both the supply and the demand side of commercial sex is likely to cost much more than supply side efforts alone.

## 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 presented at the VIV International Conference of AIDS, Barcelona, Spain. INSP, Cuernavaca, Mexico.
- 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 Cities Along the Southern Border of Mexico," *Poblaciones Moviles y VIH/SIDA en Centroamerica, Mexico, y Estado Unidos*. Article presented at the VIV International Conference of AIDS, Barcelona, Spain. INSP, Cuernavaca, Mexico.
- 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.
- Gray RH, Wawer MJ, Brookmeyer R, Sewankambo NK, Serwadda D, Wabwire-Mangen F, Lutalo T, Li X, vanCott T, Quinn TC. (2001) "Probability of HIV-1 transmission per coital act in monogamous, heterosexual, HIV-1-discordant couples in Rakai, Uganda," *Lancet*. Apr 14;357(9263):1149-53.
- 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 presented at the VIV International Conference of AIDS, Barcelona, Spain. INSP, Cuernavaca, Mexico.
- 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 presented at the VIV International Conference of AIDS, Barcelona, Spain. INSP, Cuernavaca, Mexico.
- 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/WHO Working Group on Global HIV/AIDS and STI Surveillance. (2000) "Epidemiological Fact Sheet on HIV/AIDS and sexually transmitted infections 2000 Update Mexico", UNAIDS, Geneva.
- UNAIDS. (2002) *Report on the Global HIV/AIDS Epidemic*, UNAIDS, Geneva.
- UNAIDS. (2002) *AIDS epidemic update*. December, UNAIDS, Geneva.
- Valin, J. and L. Egremy. (2002) "Investigation-Action project for STI/HIV/AIDS Prevention in the South Frontier of Chiapas, Mexico", Article presented at the VIV International Conference of AIDS, Barcelona, Spain. INSP, Cuernavaca, Mexico.
- 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=1029)**

	Whole Sample	Condom Used Sample		Condom Not Used Sample		
		SW Suggested	Client Suggested	SW Suggested	Client Suggested	Did Not Have Condom
Number of Sex Workers <sup>1</sup>	1029	877	63	18	110	36
Age	27.82 (7.77)	27.52 (7.55)	28.52 (7.59)	29.5 (8.75)	29.93 (9.24)	27.28 (8.41)
Age of first Sexual Experience	15.65 (2.36)	15.65 (2.14)	15.24 (2.01)	14.94 (2.21)	14.91 (1.73)	14.81 (2.18)
Age of first compensated sex	21.79 (5.72)	21.86 (5.66)	21.16 (5.61)	22.18 (6.78)	21.88 (6.62)	19.05 (3.10)
Very Attractive (=1)	0.21	0.20	0.212	0.02	0.11	0.11
Have Children (=1)	0.62	0.71	0.89	0.90	0.82	0.82
Can Read and Write	0.84	0.85	0.83	0.78	0.74	0.79
Had HIV test (=1)	0.89	0.89	0.92	0.92	0.89	0.88
Had STIs/vaginal problems (=1)	0.17	0.16	0.21	0.34	0.22	0.14
<i>Civil Status</i>						
Single (=1)	0.41	0.41	0.31	0.16	0.33	0.46
Married (=1)	0.22	0.05	0.10	0	0.05	0
Divorced or Widowed (=1)	0.38	0.15	0.12	0.18	0.13	0.09
<i>Primary Work Site</i>						
Bar/Club (=1)	0.82	0.83	0.70	0.92	0.69	0.86
Street (=1)	0.12	0.12	0.21	0.08	0.30	0.14
Other (=1)	0.06	0.05	0.08	0	0.01	0

Note: This table reports the means and standards deviations for non-binary variables for the whole sample and by transaction type. The number of sex workers reported in the first row indicates the number of sex workers that had at least one transaction of the type specified in the column. Therefore, the cells in row one are not mutually exclusive and do not sum to the total number of sex workers. The descriptive statistics in the columns other than the whole sample column are transaction weighted. The descriptive statistics for the whole sample are simple means and standard deviations.



**Table 3. Transaction Descriptive Statistics (N=3,837)**

	Whole Sample	Condom Used Sample		Condom Not Used Sample		
		SW Suggested	Client Suggested	SW Suggested	Client Suggested	Did Not Have Condom
Sample Size	3837	3333	152	52	234	65
Transaction Price (Pesos)	447.48 (426.09)	458.14 (434.45)	381.06 (361.91)	425.20 (430.54)	347.76 (315.50)	429.65 (416.93)
Condom Used (=1)	0.91	1.00	1.00	0.00	0.00	0.00
<b>Services Provided<sup>1</sup></b>						
Vaginal Sex (=1)	0.99	0.99	0.97	1.00	0.99	0.93
Oral Sex (=1)	0.03	0.03	0.04	0.02	0.05	0.05
Dance (=1)	0.05	0.06	0.04	0.06	0.01	0.07
Strip (=1)	0.03	0.03	0.00	0.00	0.01	0.00
Talk (=1)	0.27	0.31	0.07	0.04	0.07	0.07
<b>Client Characteristics</b>						
Age	34.19 (10.22)	33.76 (9.77)	34.93 (12.29)	35.06 (9.58)	38.50 (13.48)	39.72 (10.19)
Regular Client (=1)	0.55	0.54	0.60	0.80	0.55	0.56
Nice Personality (=1)	0.65	0.66	0.72	0.54	0.61	0.54
<b>Wealth</b>						
Poor (=1)	0.17	0.16	0.18	0.50	0.21	0.11
Average Wealth (=1)	0.71	0.72	0.73	0.36	0.62	0.84
Wealthy (=1)	0.08	0.08	0.03	0	0.10	0.04
Very Wealthy (=1)	0.04	0.04	0.06	0.14	0.07	0.01
<b>Cleanliness</b>						
Dirty (=1)	0.13	0.13	0.05	0.20	0.21	0.03
Clean (=1)	0.74	0.74	0.69	0.54	0.68	0.86
Very Clean (=1)	0.13	0.13	0.26	0.26	0.11	0.11
<b>Attractiveness</b>						
Ugly (=1)	0.30	0.30	0.21	0.34	0.33	0.21
Average (=1)	0.60	0.60	0.68	0.56	0.58	0.67
Handsome (=1)	0.10	0.10	0.11	0.10	0.09	0.12
<b>Other Activities</b>						
Client Drank Alcohol (=1)	0.84	0.85	0.45	0.76	0.723	0.79
Client Took Drugs (=1)	0.05	0.04	0.23	0.04	0.10	0.04
SW Drank Alcohol (=1)	0.73	0.74	0.49	0.74	0.68	0.75
SW Took Drugs (=1)	0.05	0.04	0.12	0.00	0.09	0.04
Client Abused/hit SW (=1)	0.02	0.02	0.00	0.00	0.05	0.02

<sup>1</sup>. In some cases, more than one service per transaction was provided. Therefore, the means of the services do not sum to one.

**Table 4. Log Transaction Price Regressions With Sex Worker Fixed Effects**

Independent Variables	Whole Sample		Exclude Always & Never Use Condom
	Random Effects	Fixed Effects	Fixed Effects
<b>Condom Use</b>			
No Condom Used - Client Suggested (=1)	0.172 (6.19)***	0.231 (8.35)***	0.242 (6.38)***
No Condom Used - SW Suggested (=1)	-0.183 (2.43)**	-0.201 (2.57)**	-0.243 (2.04)**
No Condom Used – did not have one (=1)	-0.040 (0.86)	-0.044 (0.95)	-0.035 (0.55)
Condom Used – Client Suggested (=1)	0.034 (0.80)	0.077 (1.74)*	0.107 (1.36)
<b>Services Provided by SW</b>			
Talked with Client (=1)	0.001 (0.58)	0.001 (0.49)	0.002 (0.52)
Vaginal Sex (=1)	-0.053 (1.13)	-0.071 (1.56)	-0.031 (0.31)
Oral Sex (=1)	0.183 (6.07)***	0.146 (5.00)***	0.106 (1.64)*
Danced with Client (=1)	0.070 (1.38)	-0.016 (0.27)	0.036 (0.32)
Stripped for Client (=1)	0.402 (8.09)***	0.237 (4.67)***	0.171 (1.04)
<b>Client Characteristics</b>			
Regular Client (=1)	0.007 (0.43)	0.021 (1.32)	0.089 (2.51)**
Clients' Age (=1)	0.000 (0.69)	0.001 (1.62)	0.001 (0.55)
Client was Average Wealth (=1)	0.106 (5.71)***	0.063 (3.39)***	0.116 (2.95)***
Client was Wealthy (=1)	0.227 (8.33)***	0.142 (5.24)***	0.183 (2.90)***
Client was Very Wealthy (=1)	0.317 (9.90)***	0.249 (7.92)***	0.275 (4.54)***
Client was nice (=1)	0.026 (1.46)	-0.024 (1.31)	-0.010 (0.26)
Client was Dirty (=1)	0.007 (0.36)	0.022 (1.10)	0.015 (0.32)
Client was Very Clean (=1)	0.030 (1.11)	0.025 (0.86)	0.002 (0.04)
Client was Ugly (=1)	-0.042 (2.61)***	-0.028 (1.76)*	-0.019 (0.50)
Client was Handsome (=1)	-0.011 (0.59)	-0.026 (1.40)	-0.059 (1.43)

**Table 4. Basic Log Price Fixed Effects Regressions (Continued)**

Independent Variables	Whole Sample		Exclude Always & Never Use Condoms
	Random Effects	Fixed Effects	Fixed Effects
<b>Transaction Location</b>			
Met client at a bar\club (=1)	0.371 (5.51)***	0.174 (1.73)*	0.335 (1.82)*
Met client on the street (=1)	0.025 (0.34)	0.359 (3.34)***	0.705 (3.50)***
<b>Other Activities</b>			
Client abused SW (=1)	-0.002 (0.04)	0.013 (0.34)	0.069 (0.92)
Client drank alcohol (=1)	0.044 (1.92)*	-0.056 (2.40)**	-0.107 (2.13)**
Client took drugs (=1)	0.023 (0.87)	0.037 (1.46)	0.080 (1.59)
SW drank alcohol (=1)	0.104 (4.71)***	0.020 (0.89)	0.058 (0.91)
SW took drugs (=1)	0.072 (2.16)**	0.037 (1.13)	-0.007 (0.11)
<b>Summary Statistics</b>			
Within R <sup>2</sup>	0.067	0.096	0.129
Hausman Test (Chi 2)	583.38***		
F Statistic for joint significance of Sex Worker Fixed Effects		28.37***	15.86***
Number of Observations	3837	3837	1225
Number of SWs	1029	1029	341

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

**Table 5. Random Effects Multinomial Logit Condom Choice Regression**

	No Condom Use- Client Suggested	Condom Use- Client Suggested
<b>Sex Worker Characteristics</b>		
Literate (=1)	0.374 (1.75)*	1.084 (0.10)
Attractive (=1)	0.339 (1.94)*	0.223 (1.65)*
Married (=1)	0.488 (0.76)	2.100 (0.80)
Had an HIV tested (=1)	0.902 (0.18)	0.419 (1.05)
Had an STI or Vaginal Problem (=1)	1.775 (1.01)	2.249 (1.29)
Age	0.998 (0.06)	1.156 (1.85)*
Age of first sex	0.607 (4.00)***	1.153 (1.18)
Age of first compensated sex	0.961 (0.73)	0.825 (1.76)*
<b>Client Characteristics</b>		
Regular Client (=1)	1.174 (0.40)	1.747 (0.99)
Age	1.051 (3.66)***	0.977 (0.88)
Average Wealth (=1)	2.502 (1.58)	0.787 (0.29)
Very Wealthy (=1)	3.192 (1.55)	0.572 (0.47)
Nice Personality (=1)	0.910 (0.22)	6.178 (2.38)**
Dirty (=1)	2.406 (1.97)**	1.498 (0.51)
Very Clean (=1)	1.000 (0.00)	2.320 (1.18)
Ugly (=1)	0.628 (1.15)	1.936 (1.08)
Handsome (=1)	2.270 (1.59)	4.497 (2.38)**

**Notes:** This table reports the coefficients as odds ratios and absolute values of z statistics in parentheses. The default category is sex worker suggested condom use. The symbol \* signifies that the coefficient is significant at 10%; \*\* significant at 5%; \*\*\*significant at 1. The model was estimated using 3393 observations from 930 sex workers. The number of observations decreases here due to missing values for some of the sex worker characteristics. The value of the log likelihood was -802.62.

**Table 6. Log Price Fixed Effects Regressions with Client/Sex Worker Characteristics Interactions**

	Model 1	Model 2	Model 3
<b>Who Suggested Condom and Non-condom Use</b>			
Non-Condom Use - Client Suggested	0.246 (8.64)***	0.331 (1.47)	0.253 (1.18)
Non-Condom Use - SW Suggested	-0.184 (2.15)**	-0.187 (2.20)**	-0.185 (2.18)**
Client Suggested Condom Use	0.086 (1.84)*	-0.304 (1.14)	0.088 (1.90)*
<b>Sex Worker Risk Characteristics Interacted with Client suggested <u>not</u> using a condom</b>			
(Literate) × (client suggested non-condom use)		-0.004 (0.05)	
(Attractive) × (client suggested non-condom use)		0.181 (2.08)**	0.211 (2.52)**
(Age of First Sex) × (client suggested non-condom use)		-0.000 (0.02)	
F Statistic for joint significance of SW risk variables		1.50	
<b>Sex Worker Risk Characteristics Interacted with Client suggested using a condom</b>			
(Attractive) × (client suggested condom use)		-0.084 (0.60)	
(Age) × (client suggested condom use)		-0.014 (1.54)	
(Age of first sex for money ) × (client suggested condom use)		0.035 (2.41)**	-0.002 (0.15)
F Statistic for joint significance of SW risk interactions		2.66**	
<b>Client Risk Characteristics Interacted with Client suggested <u>not</u> using a condom</b>			
(Age) × (client suggested non-condom use)		-0.002 (1.39)	
(Dirty) × (client suggested non-condom use)		-0.051 (0.88)	
F Statistic for joint significance of client risk interactions		1.26	
<b>Client Risk Characteristics Interacted with Client suggested using a condom</b>			
(Nice Personality) × (client suggested condom use)		0.067 (0.86)	
(Handsome) × (client suggested condom use)		-0.009 (0.10)	
F Statistic for joint significance of client risk interactions		0.37	
Within R <sup>2</sup>	0.08	0.09	0.08
Number of Transactions	3585	3585	3585
Number of Sex Workers	956	956	956

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 4. Once again, the sample size is smaller due to missing values for some of the sex worker characteristics. \* significant at 10%; \*\* significant at 5%; \*\*\*significant at 1%.

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

