



# Men's revealed preferences regarding women's promiscuity



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## ABSTRACT

Men have evolved to exhibit a desire for chastity and sexual fidelity and an abhorrence of promiscuity in long-term mates. We investigated whether these preferences manifest themselves even in an unlikely situation (prostitution) by observing men's behavior. We considered 8817 prostitutes under age 45 who worked in Indonesian cities in 2002–2004. We measured female promiscuity by experience in prostitution and applied OLS to determine whether clients paid more to less experienced prostitutes. After controlling for a set of characteristics of prostitutes and clients, we found that compared to prostitutes with an experience  $\leq 1$  year, prostitutes with an experience of 2–4 years earned 4.2% less, and those with an experience  $> 4$  years earned 7.7% less. The difference is great because a value of 4.2% is just under the daily expenditure per capita on food. The relationship was more pronounced for prostitutes of high fertile age and for prostitutes with greater negotiability. It seems that the preferences are strongly built in men's psychology.

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## 1. Introduction

Men and women face different probabilities of parenthood. Since women conceive internally, their maternity is guaranteed. Men, however, can never be sure of their paternity. Ovulation is concealed in women, so men must seclude their mates from other men for a period of months to be certain of their paternity. Even if their mates do not want to bear other men's offspring, rape always poses a threat to certainty in paternity. Male sexual jealousy helps men guard their mates and dissuade other men from inseminating their mates, thereby presenting one solution to the problem of paternity certainty (Daly, Wilson, & Weghorst, 1982).

Another solution is mate preferences, such as a desire for chastity and sexual fidelity and an abhorrence of promiscuity (Buss & Schmitt, 1993). These male preferences have typically been discussed in the context of long-term relationships, and they have been supported by subjective data (for a review, see Buss, 2003). If evolution is involved in developing these preferences in men, however, men would exhibit the preferences even in an unlikely situation; for instance, a one-time encounter between two parties who know that a future re-encounter and reproduction are unlikely. This assessment is of great interest because it indicates how strongly the evolved preferences are built in men. In addition, what people say is not necessarily the same as what they do. When the stakes are low, people can say anything. For example, a man may say that he does not care about female virginity for a long-term mate, even when he does. This can happen if he wants to conform

to social norms. Therefore, it is more convincing to analyze behavioral, rather than subjective, data to understand human preferences.

To the best of our knowledge, no study has used behavioral data to investigate whether the preferences manifest themselves even in a very unlikely situation: prostitution. Prostitution involves a short-term and mostly one-time relationship, while (male) clients are aware that reproduction is unlikely. Furthermore, because prostitutes' goal is to maximize earnings, they have every reason to lie to clients if doing so increases their earnings. For example, if a client pays more to an inexperienced prostitute than to an experienced prostitute, although they are the same age, an experienced prostitute would lie that she is inexperienced. On the other hand, knowing that prostitutes prevaricate regarding experience in prostitution, clients have to resort to their instinct and act upon it. If we observe the preferences even in this extremely tough situation, we can claim that the preferences are strongly built in men's psychology.

There are more reasons why prostitution provides an interesting case. First, men buy sex, so one can directly observe what they do rather than what they say. If the stakes are low, what men do may not reveal their true preferences. However, the stakes in Indonesian prostitution are never low. For example, according to Indonesian female prostitutes aged 18–44 who reported positive prices for the last act of commercial sex, the median price for sex was Rp. 100,000 in each of 2002, 2003, and 2004. This figure is about two thirds of the average monthly expenditure per capita on food in urban areas in these years; alternatively, it is as great as that in rural areas. Second, prostitution primarily concerns money, so it is relatively easy to determine the value placed by men on some attribute of a sexual partner. Using monetary values is more precise than asking men how important a certain attribute is and receiving vague answers like “very important,” “important,” or “unimportant.”

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If prostitution is illegal, we would observe only selective choices, which may cause bias in analysis. For example, if cautious men do not buy sex, we would observe only careless men's behaviors, and it is difficult to generalize these results to all men. In addition, illegality forces men to limit themselves to certain behaviors, so we would observe a limited range of male behaviors. One may wonder whether money paid for sex correctly reflects the value that the client places on a certain attribute of the prostitute. In this regard, examining prostitution in Indonesia is appealing because its institutional settings ameliorate these concerns. Prostitution in Indonesia is quasi-legal, and the prostitution market is competitive (Hull, Sulistyarningsih, & Jones, 1998). Prostitution is quasi-illegal because local governments themselves (in collaboration with military authorities) operate official red-light districts called *lokalisasi*, which are clusters of brothels along one or a few streets. Because prostitution is quasi-legal, we can observe a large pool of men and their free choices. Violence in prostitution in Indonesia is almost non-existent. Of 11,504 prostitutes under 45 years of age in Pisani's (2008) study, only 399 prostitutes (3.5%) said that they had been forced to have sex even though they did not want to and were not paid by clients in the previous year. Indonesian prostitutes are also mobile; 42.5% of our sample worked outside their provinces of origin. Considering the voluntary nature, high mobility, and low entry barriers to prostitution, prostitution in Indonesia operates in a competitive market. The competitive nature of the market means that the client does not need to pay more than what he values. If a prostitute demands more than he values, he can buy the same service from another prostitute at the "right" price. Therefore, the price of sex in the data is close to the value that the client places on the service. More interestingly, the competitive nature forces prostitutes to do their best to look inexperienced because, as shown below, that is what clients want. Therefore, it is difficult for clients to correctly identify prostitutes' experience. Even without these explanations, since commercial sex is simply another service on sale and both parties know that reproduction is unlikely, clients have little incentive to pay more than what is necessary. Otherwise, they would enjoy fewer acts of sex.

We analyzed clients' responses to prostitutes' length of time in prostitution to determine whether men behave in a consistent manner dictated by their preferences (i.e., desire for chastity and sexual fidelity and abhorrence of promiscuity). The idea is that less experienced prostitutes are analogous to potential mates with more chastity, more sexual fidelity, and less promiscuity. Prostitutes sell sex to earn money, and to earn more money, they have to serve more men; more experience in prostitution mechanically involves more men. If this analogy is reasonable and men follow the preferences, we would observe that the price of sex decreases with the prostitute's experience in prostitution. This is indeed what we observed. This main finding was robust to specification changes and was not driven by some idiosyncrasies in our dataset. Our dataset is unique even in research on prostitution in that it covered a minimum of 10 main cities and concerned three years. The range of prostitutes was wide enough to include cheap prostitutes on the street and expensive prostitutes in bars, and the range of clients was also wide enough to include local residents and foreigners. The large sample size ( $N = 8817$ ) enhanced estimation precision. Sohn (forthcoming) analyzed this dataset to determine whether clients paid more to younger prostitutes, and we extended his analysis. Considering the male preferences discussed above, we hypothesized that clients paid more to less experienced prostitutes of the same age.

## 2. Data

Our main dataset is the Behavioral and Drug-Taking Risk Behavior among Female Sex Workers and Men in Mobile Occupations in Indonesia, 2002–2004. The dataset and explanations on it are publicly available at <http://thedata.harvard.edu/dvn/dv/pisani>. The title of the dataset indicates that it concerns behavior. And a client paid following his preferences, which is behavioral; he did not say about his

preferences, which is subjective. In addition, the prostitute reported her client's behavior, which presumably enhances the objectivity of the behavioral information.

In 2002, the Indonesian Ministry of Health took over a program monitoring the behaviors of people in groups at a high risk of HIV infection. Surveys were performed by the Indonesian Bureau of Statistics with the help of NGOs, with technical support from Family Health International, and with funding from USAID. Two rounds of surveillance were performed in 2002–2003 for 10 cities and in 2004 for 15 cities. Sample locations were first identified, and respondents at the sampling locations were selected as randomly as possible. Importantly, interviews were conducted after a number of local approaches, including rapport building, were undertaken; this was intended to ameliorate the concern that the prostitutes being surveyed might not be honest with strangers. Thus, it may be of less concern that they intentionally lied about their experience in prostitution. This is more so because, as the title of the survey suggests, the survey mainly concerned epidemiology, not their demographics. However, the nature of the survey limited our range of covariates.

The dependent variable of interest was the amount of money received by the prostitute during the last act of commercial sex. Because the OLS error is assumed to be normal and the natural log of the price of sex was more normally distributed than the untransformed one, we placed the natural log of the price of sex on the left hand side of the specification. By referring to the last act, the survey attempted to reduce recall bias and measurement error in the price since recalling the last transaction is easier and more accurate than recalling all transactions for a certain period, say, a month or a year. This is particularly the case because, unlike workers in the legal sector, prostitutes do not receive formal statements of wages. It is unclear whether the price of sex included the pimp's share. However, this is not a great concern because even if the share was included in the reported price, thereby exaggerating the price, prostitutes managed by pimps typically receive free accommodations, free meals, regular medical check-ups, loans at low interest, and assistance related to their line of work (e.g., laundry and security). Hence, exaggeration in the price, if any, is probably small.

In the first round, prostitutes in Jakarta, Riau, and Sumut were asked about payment from non-regular clients, but no distinction between regular and non-regular clients was made for the other cities in the first round and all cities in the second round. We controlled for city and year fixed effects to alleviate concerns stemming from this inconsistency. Although we were constrained by the nature of the survey, we selected as many covariates as possible to account for factors that could confound the relationship between experience in prostitution and the price of sex. Outliers reduce estimation precision and bias estimation. In the original data, the maximum age was 99, followed by 80, 75, and so on. If true, these old ages are outliers in prostitution; probably, they are recording errors. In addition, regardless of age, men prefer women of high fertile age, and these women dominate prostitution; our data agreed. We thus excluded women aged 45+, the cutoff being the 95th percentile of age in the original data. When we excluded observations with missing values, we were left with 8817 prostitutes.

This dataset has three important advantages over other datasets; none of these is unique in itself, but the combination is. First, the sample size was larger than other samples of prostitutes. For example, Rao, Gupta, Lokshin, and Jana (2003) examined 608 prostitutes; Gertler, Shah, and Bertozzi (2005) 1029, Arunachalam and Shah (2008) 2925 in Ecuador and 1083 in Mexico, and Cunningham and Kendall (2011) 395–521 (using an online survey with a response rate lower than 5%). Second, our sample included various types of prostitutes. They broadly comprised direct prostitutes (e.g., prostitutes who work in brothels and on the street) and indirect prostitutes (e.g., prostitutes who work in hotels, massage parlors, and bars). These two groups were proportionately balanced and were further divided. By contrast, Rao et al. (2003) considered only prostitutes working in brothels, and Cunningham and Kendall (2011) considered only prostitutes who

advertised online. Third, the price of sex was measured based on the prostitute's last act of commercial sex, which separated productivity from working time. This issue is important as illustrated by the following example. Suppose that two prostitutes earn the same amount of money during a certain period. It is then difficult to tell whether they charged the same price and served the same number of clients or whether one prostitute charged more per act of commercial sex and served fewer clients than the other. For this study, it is crucial to know the price of sex per act because we were interested in the value placed by the client in one encounter on the prostitute's experience in prostitution. In contrast, Arunachalam and Shah (2008) and Cunningham and Kendall (2011) considered weekly earnings.

### 3. Empirical methods

The main empirical model was OLS, and the specification was as follows:

$$y_i = \exp_i \beta_1 + X_i \beta_2 + u_i, \quad (1)$$

where  $y_i$  refers to the natural log of the price of sex received by prostitute  $i$ ,  $\exp$  to a series of dummy variables indicating her experience in prostitution,  $X$  to a set of individual covariates and city and year fixed effects,  $u$  to the error term, and the  $\beta$  to coefficients to estimate.  $X$  contained age, years of schooling, whether she was married or not, age at first sex, whether she migrated from another province or not, whether she had used illegal drugs or not, whether she had been drunk or not, number of clients during the last day, whether she used condoms during the last sex, whether or not she often or always proposed condom use during the last week, location of sex, the client's resident area. We later added the kind of work done by most of her clients from the last week to check the robustness of the results.

We employed a series of dummies for exp because it is non-parametric. If exp is parameterized, whether in linear or non-linear form, a small number of observations can change the shape of the relationship between experience in prostitution and the price of sex. A non-parametric method is more robust than a parametric one, and appealing particularly when the sample size is large as in our case. Prostitution in Indonesia is dominated by young women with short experience in prostitution. We thus implemented the following categories of experience in prostitution:  $\leq 1$  year, 1–2 years, 2–4 years, and  $> 4$  years. For convenience, we referred to prostitutes with an experience  $\leq 1$  year as novice prostitutes and to prostitutes with an experience  $> 4$  years as veteran prostitutes; the former were the reference group when we interpreted the coefficients on the experience dummies. We chose four categories because results presented by four categories are simple but not too simple or not too overwhelming. While fewer categories would conceal substantive differences for the first several years in prostitution, more categories would make it difficult to appreciate the results, without adding substance. We chose the cutoff points because they distributed prostitutes more or less evenly (Table 1).

## 4. Results

### 4.1. Descriptive statistics

Because it is rare to peruse information on prostitution to this extent, it is of interest to examine the descriptive statistics in Table 1. This exercise also helps to place our main results in context. To save space and focus on our main issues, however, we discussed only several important variables.

We already mentioned how high the price of sex was in Indonesia. The mean experience in prostitution was 2.8 years, which indicates that prostitution is a short-term job in Indonesia. This characteristic is consistent with our main finding that more experienced prostitutes earned less per act of sex, and the magnitude of the relationship was

**Table 1**  
Descriptive statistics.

Variable	Mean (SD)
<b>Continuous variable</b>	
Ln (price of sex)	12.14 (0.95)
Years in prostitution	2.8 (3.2)
Years of schooling	7.5 (3.3)
Age	26.8 (6.2)
Age at the first sex	17.3 (2.8)
# of clients during the last day	1.6 (1.3)
<b>Discrete variable</b>	
%	
Years in prostitution $\leq 1$	32.4
1–2	21.2
2–4	24.6
$> 4$	21.8
Non-married	87.2
Married	12.8
Working in the province of origin	57.5
Working outside the province of origin	42.5
Have not used illegal drugs	85.8
Have used illegal drugs	14.2
Have not ever been drunk	61.2
Have ever been drunk	38.9
Did not use condoms during the last sex	42.9
Used condoms during the last sex	57.2
Never or occasionally proposed condom use during the last week	39.9
Often or always proposed condom use during the last week	60.1
<b>Location</b>	
Brothel	41.1
Street or park	10.0
Hotel	4.1
Massage parlor or salon	17.3
Karaoke bar, disco bar, or liquor bar	25.3
Others	2.2
The last client was a local resident	51.0
The last client was Indonesian from another province	34.0
The last client was a foreigner	8.0
Don't Know or remember where he came from	7.0
<b>Most common occupation of clients during the last week<sup>a</sup></b>	
Don't know or no response	37.7
Students, laborers, unemployed workers, or others	13.2
Policemen, military men, civil servants	8.6
Private sector workers	25.0
Traders	15.6
<b>Survey year 2002</b>	
2003	23.4
2004	48.4
N	8817

<sup>a</sup> The sample size only for this variable is 4267.

large. In other words, prostitutes somehow know that more experience in prostitution reduces their earning power and leave the profession. The distribution of years in prostitution was relatively even among the categories. The proportion of novice prostitutes was the largest at 32.4%. Prostitutes with an experience of 1–2 years accounted for 21.2%, and those with an experience of 2–4 years accounted for 24.6%. More than three quarters of the prostitutes had an experience of 4 years or less, which also highlights the short-term nature of the profession.

The mean of years of schooling was 7.5 years, meaning that they were not well educated. Their level of education is much lower than that of women of similar characteristics. For example, we combined the Indonesian Family Life Survey (IFLS) for the year 2007 and the IFLS-East for the year 2012; together, the data are representative of the Indonesian population. We then extracted women similar to prostitutes in our sample: female workers aged 17–40 who resided in urban areas, earned a positive amount of money, and did not engage in agriculture, forestry, fishing, or hunting. The mean of their years of schooling was 11.0 years. The lower level of education of prostitutes

supports the argument of low entry barriers to prostitution (for more about female workers in Indonesia, see Sohn, 2015).

It is of great interest to know that 12.8% of prostitutes in our sample were married. The data did not allow us to determine whether their husbands knew that their wives sold sex, but it demonstrates that marriage and prostitution can coexist. The range of location of prostitution was wide, including brothels, streets, parks, hotels, massage parlors, salons, karaoke bars, disco bars, and liquor bars. The range of clients was also wide, from local residents and Indonesians from other provinces to foreigners. Furthermore, albeit only for the year 2004, the range of clients' occupations varied, including students, laborers, unemployed workers, policemen, military men, civil servants, private sector workers, and traders. These diverse ranges of characteristics indicate that our data represent prostitutes in Indonesia well.

#### 4.2. Intuitive results

In general, older prostitutes tend to have more experience in prostitution because prostitutes start the profession when young; this is the period when the price of sex is high (Sohn, forthcoming). Table 2 confirms that age and experience in prostitution in Indonesia move together. The median age was 24 for novice prostitutes, 25 for prostitutes with an experience of 1–2 years, 26 for prostitutes with an experience of 2–4 years, and 30 for veteran prostitutes. Hence, it is essential to control for age when relating experience in prostitution to the price of sex.

Before presenting results derived from Eq. (1), we drew a graph to provide an intuitive understanding of the relationship and to help one better understand our formal results. Albeit rough, this graph contains our main message. Because intuition is the key in this graph, we controlled for age by charting the relationship for each age group. We created six age groups in five-year intervals. As with experience in prostitution, this number of categories was just enough without losing much substance. If the number was smaller than this, the results would miss subtle differences between age groups; if the number was greater, the results would be not intuitive but confusing.

Given the male preferences for young, fertile women, it is not surprising to find that younger prostitutes earned more, regardless of experience in prostitution (Fig. 1). More importantly, the slope of the relationship was particularly steep for the youngest age group (i.e., <20), but the age groups 20–24, 25–29, and 30–34 also exhibited a negative relationship. However, the relationship started to weaken for the age group 35–39 and it was even reversed for the age group 40–44. Therefore, although the patterns are not as straightforward as expected, they are generally consistent with the expectation that the relationship would be more pronounced for prostitutes of higher fertile age.

#### 4.3. Main results

Table 3 starts with a simple case where we controlled for only the series of dummies for experience in prostitution (Column 1). There was no statistically significant difference in the price of sex between novice prostitutes and prostitutes with an experience of 1–2 years. This finding suggests that it is difficult for men to distinguish novice prostitutes from slightly more experienced prostitutes. However, prostitutes with an

experience of 2–4 years received 13.5% ( $= \exp(-0.145) - 1$ ) less than novice prostitutes. The corresponding figure for veteran prostitutes was 28.9%. It is surprising to find that only a few more years in prostitution decreases the price of sex to a large degree.

Since age and experience in prostitution were positively correlated (Table 2), the coefficient on experience in prostitution could capture the effect of age. Although Fig. 1 intuitively addresses this concern, we repeated the specification by adding age (along with year fixed effects) to formally assess the degree to which age confounded the relationship between experience in prostitution and the price of sex. Column 2 shows that controlling for age decreased (in absolute value) the coefficients on the experience dummies. The coefficient on an experience of 2–4 years decreased from  $-0.145$  to  $-0.092$ , and that on an experience  $>4$  years decreased from  $-0.341$  to  $-0.160$ . Nevertheless, the negative relationship continued to hold. Since Sohn (forthcoming) extensively discussed the non-linear negative relationship between age and the price of sex, we omitted explanations on it.

It is possible that the relationship between experience in prostitution and the price of sex captured other characteristics correlated with experience in prostitution. For example, experienced prostitutes may more frequently work in brothels and on the street than in bars. Alternatively, they may serve Indonesians rather than foreigners. We thus added a set of covariates. The results in Column 3 demonstrate that more educated prostitutes enjoyed higher prices. In addition, prostitutes who tended to be wild (having used illegal drugs and been drunk) earned more,<sup>1</sup> and there was a tradeoff between the quantity and quality of clients (i.e., more customers at lower prices). Prostitutes who often or always proposed using condoms during the last week earned more than those who did not. Given that clients generally prefer not using condoms (Rao et al., 2003; Gertler et al., 2005), this finding possibly indicates the prostitutes' high bargaining power (e.g., more beautiful). We observed a price hierarchy among locations of prostitution—cheap in brothels and on the street and expensive in bars. Clients farther from the location of sex paid more, possibly because they were unfamiliar with local information, such as the going rate.

More importantly, this array of covariates decreased the strength of the relationship between experience in prostitution and the price of sex, but the relationship continued to be statistically significant, and the magnitude was not negligible. Compared to novice prostitutes, prostitutes with an experience of 2–4 years earned 4.2% less. The corresponding figure for veteran prostitutes was 7.7%. Recall that the median price of sex was two thirds of the average monthly expenditure per capita on food in urban areas. Thus, the decrease in the price of sex accompanied by a few more years of engagement in prostitution is substantial. For example, a value of 4.2% means just under one-day's ( $= 30 \text{ days} \times \text{two thirds} \times 4.2\%$ ) expenditure per capita on food. The reduction was caused by only one act of commercial sex—simply put, selling sex for a few more years costs prostitutes approximately one day's food expenditure for each act of sex. If more experienced prostitutes are considered or the reference area is rural, the reduction in the price of sex is greater.

We performed additional analyses to insure that our main results in Table 3 were robust. We explained the analyses but omitted the results to save space. The survey for the year 2004 contained information on the client's occupation, so we analyzed only this survey and added the client's occupation to Eq. (1). We also restricted the sample to prostitutes aged under 35 because they exhibited a more pronounced relationship between experience in prostitution and the price of sex (Fig. 1). In addition, we created two (novice vs. the rest) categories of experience in prostitution to simplify the results. Furthermore, we parameterized experience in prostitution in linear or quadratic form, instead of a series of dummies. In all cases, the results suggest that our main results were rather conservative.

**Table 2**

Relationship between age and experience in prostitution.

Years in prostitution	Median age	N
≤1	24	2854
1–2	25	1869
2–4	26	2168
>4	30	1926

<sup>1</sup> It is equally possible that more earnings allowed them to be wild.

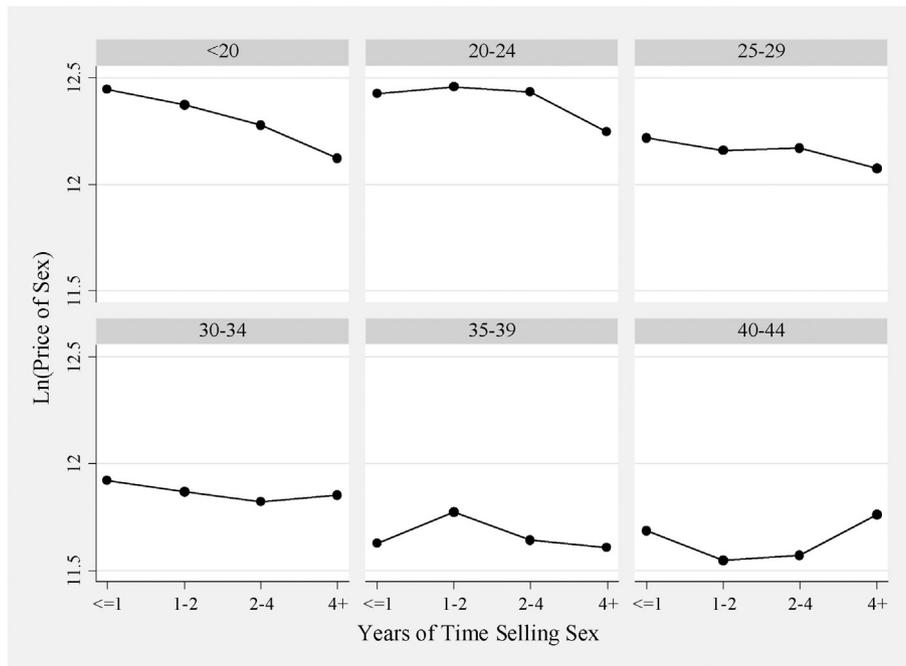


Fig. 1. Relationship between experience in prostitution and the price of sex by age group.

#### 4.4. Additional results

Overall, it seems clear that less experienced prostitutes earned more. This idea is based on the assumption that the prostitute and the client can negotiate and adjust the price of sex. If there is no room for adjustment, it would be difficult to see the difference in the price of sex by experience. As mentioned in the introduction, local governments are heavily involved in brothels, and they generally set the price of sex. By contrast, there is room for negotiation for other types of prostitutes. We thus expected a stronger relationship between experience in prostitution and the price of sex in locations other than brothels. To confirm this idea, we divided locations of sex into brothels and elsewhere, where “elsewhere” excluded prostitutes with a location of “others” ( $N = 191$  or 2.2% of the sample size) and consisted of streets, parks, hotels, massage parlors, salons, karaoke bars, disco bars, and drinking bars.

We estimated Eq. (1) with the full set of covariates, and Columns 1 and 2 of Table 4 list the results. Although the signs were “correct,” the relationship was weak for brothels (Column 1); on the other hand, the relationship for elsewhere (Column 2) was statistically significant and stronger than that for brothels and that for the pooled sample. The results suggest that when men are allowed to express their evolved preferences, they aptly do it. If negotiability is important in the relationship, the relationship would be stronger for Indonesian clients than for foreign clients possibly because of language barriers. We excluded foreigners from the pooled sample and estimated Eq. (1), controlling for the full set of covariates. Column 3 confirms our conjecture. The overall results in Table 4 reinforce the argument that our main results in Column 3 of Table 3 were conservative.

#### 5. Discussion

We investigated whether it was possible to observe the male preferences—considered to be related to long-term mating—in a one-time encounter, where both parties knew that reproduction was unlikely. This exercise allowed us to assess how strongly these preferences are built in men. Our results, derived from prostitution in Indonesia demonstrated that men exhibited these preferences by paying less to more

experienced prostitutes. The large size of the relationship indicates that men are sensitive to this characteristic. In a sense, it is remarkable to find this strong response, because clients in our data had no reliable information on the prostitutes' experience. The negative relationship is more remarkable since, via learning by doing, more experienced prostitutes probably knew better what clients wanted, such as appearing to be inexperienced, and how to disguise themselves to meet the demand. Furthermore, the negative relationship indicates a minimal role of selection, whereby less profitable prostitutes leave the profession over time; in this case, we would observe a positive relationship between experience in prostitution and the price of sex. We speculate that evolution equipped men with a powerful device to correctly guess female chastity, sexual fidelity, and promiscuity, and men use it even in a one-time encounter. By advancing this speculation, we do not argue that an abhorrence of female promiscuity in a short-term relationship improves men's reproductive fitness. The opposite is probably a better strategy for men. We only argue that men appear to be able to correctly guess female promiscuity.

It could be that the negative relationship has nothing to do with this ability but simply indicates an aversion to sexually transmitted diseases (STDs) if less experienced prostitutes are less likely to have one. The survival instinct honed by evolution might kick in when men select prostitutes. At first, this interpretation sounds plausible because STDs may have important effects on the evolution of their hosts, especially on the host's mating system (Kokko, Ranta, Ruxton, & Lundberg, 2002). Some STDs were deadly before conquered by modern medicine (e.g., penicillin) (Quétel, 1992); AIDS is yet to be conquered. An aversion to STDs could work independently of the male preferences discussed above and generate our results. We do not deny this aversion, but we are not sure of its strength. Evolution developed some strong fears, such as height and snake, but a fear of STDs is not strong and pervasive enough to be discussed along with other fears (Davey, 1997). Nor is this aversion strong enough to reduce men's voracious appetite for sex; recall that prostitution is the oldest profession. Furthermore, even if this aversion were strong, this interpretation assumes that a man knows a prostitute's experience to relate it to her probability of having STDs. We supported this assumption, so the alternative interpretation requires ours to be convincing.

**Table 3**

Relationship between experience in prostitution and the price of sex: main results.

	1	2	3
Years in prostitution ≤1	(reference)	(reference)	(reference)
1–2	–0.045 (0.028)	–0.035 (0.025)	–0.020 (0.019)
2–4	–0.145 (0.027) <sup>***</sup>	–0.092 (0.024) <sup>***</sup>	–0.043 (0.018) <sup>**</sup>
>4	–0.341 (0.027) <sup>***</sup>	–0.160 (0.027) <sup>***</sup>	–0.080 (0.020) <sup>***</sup>
Age (/10)		–0.407 (0.016) <sup>***</sup>	–0.190 (0.014) <sup>***</sup>
Years of schooling			0.050 (0.003) <sup>***</sup>
Married			0.013 (0.021)
Age at first sex			0.003 (0.003)
Outside the province of origin			0.028 (0.016)
Have ever used illegal drugs			0.117 (0.022) <sup>***</sup>
Have ever been drunk			0.120 (0.015) <sup>***</sup>
# of clients during the last day			–0.042 (0.007) <sup>***</sup>
Used condoms during the last sex			0.031 (0.018)
Often or always proposed condom use during the last week			0.058 (0.018) <sup>***</sup>
Brothel			(reference)
Street or park			0.041 (0.029)
Hotel			0.599 (0.045) <sup>***</sup>
Massage parlor or salon			0.645 (0.022) <sup>***</sup>
Karaoke, disco, or bar			1.127 (0.023) <sup>***</sup>
Others			0.336 (0.058) <sup>***</sup>
The last client was a local resident			(reference)
The last client was Indonesian from another province			0.115 (0.016) <sup>***</sup>
The last client was a foreigner			0.322 (0.030) <sup>***</sup>
Don't Know or remember where he came from			–0.086 (0.025) <sup>***</sup>
Constant	12.26 (0.02) <sup>***</sup>	13.29 (0.05) <sup>***</sup>	11.71 (0.06)
Survey years	No	Yes	Yes
City fixed effects	No	No	Yes
N	8817	8817	8817
Adj. R Sq.	0.019	0.252	0.577

Notes: Robust standard errors are in parentheses.

\*\* p-value &lt; 0.05.

\*\*\* p-value &lt; 0.01.

Another interpretation is that less experienced prostitutes were more novel (the new face on the block), so men paid more. Note that men have a strong preference for sexual variety and for access to novel sexual partners (Buss & Schmitt, 1993). However, novel prostitutes abound in Indonesia because of the fast turnover of prostitutes and the quasi-legal and competitive nature of the market. Few men could afford the high price of sex to be satiated with all prostitutes on the block. Hence, the alternative interpretation is not plausible. It could be that less experienced prostitutes charged more than the going rate simply they did not know the market condition well. The competitive nature of the market, however, discounts this interpretation; men could buy the same service at the “right” price. One could object that if more experienced prostitutes were managed by pimps and gave them a share, we would exaggerate the price of sex paid to less experienced prostitutes relative to more experienced prostitutes. It, however, stands to reason that as in other industries such as sports

and entertainment, less experienced prostitutes are more likely to need managers, namely, pimps for a lack of inside information. If this is the case, we rather understated the price paid to less experienced prostitutes.

Although we tried to exploit the data to the full extent, there are some limitations. We do not know how men in our data could correctly guess prostitutes' experience. The transaction occurred spontaneously, and correctly guessing their experience was never important in the hot moment. We thus doubt that the men consciously took time to investigate their prostitutes' experience; unconsciousness must have played the primary role. This study concerns a single country, so our results may not be generalized to other countries. Evolution influenced all humans, however. We thus believe that other populations are likely to exhibit similar behaviors. This study concerns men, but future research may focus on women. Whereas men tend to be attracted to women with more chastity, more sexual fidelity, and less promiscuity

**Table 4**  
Relationship between experience in prostitution and the price of sex by negotiability.

	1 Brothels	2 Elsewhere	3 Indonesian clients
Years in prostitution ≤1	(reference)	(reference)	(reference)
1–2	0.020 (0.024)	−0.027 (0.026)	−0.020 (0.020)
2–4	0.016 (0.023)	−0.076 (0.026)***	−0.055 (0.020)***
>4	−0.016 (0.025)	−0.109 (0.030)***	−0.085 (0.022)***
Full set of covariates	Yes	Yes	Yes
N	3626	5000	7493
Adj. R Sq.	0.263	0.533	0.556

Notes: Column 2 excluded prostitutes with a location of “others.” Robust standard errors are in parentheses.

\*\*\* p-value < 0.01.

in long-term mating, women tend to be attracted to men with resources. It would be of great interest to determine whether women can successfully identify resourceful men even in an unlikely situation, analogous to prostitution for men. Because our data do not contain much information on clients, we could not perform more nuanced analyses. Repeating the analysis while including client characteristics could be of interest. That said, given the conservative nature of our results, it is unlikely that controlling for more covariates would substantially decrease the relationship between experience in prostitution and the price of sex. Nevertheless, with better data and more observations, it is worth determining which group of men exhibits a more pronounced relationship between the two (e.g., young vs. old and high vs. low socioeconomic status).

One way to understand human mating is to perform an experiment on a small number of people. This method does not guarantee whether the results apply to the general population. This concern cannot be addressed even by a randomized controlled trial, which is considered to be the gold standard (Cartwright, 2007). Another way is to observe mating behaviors in small-scale traditional societies. This method does not guarantee whether the results apply to contemporary modern societies. Furthermore, in such societies, some critical variables for human mating are likely to be quite inaccurate. For example, if a person does not need to report his age as often as in a contemporary modern society, his reported age tends to be inaccurate. This tendency was so common in the past (as late as the 19th century and as developed as the US) that some historians took advantage of it to calculate the numeracy of a population (e.g., Sohn, 2014). These two methods are typically used by evolutionary psychologists. Researchers have recently employed lonely hearts advertisements and commercial dating services (e.g., Kurzban & Weeden, 2005; Pawlowski & Koziel, 2002). Of course, no method is perfect, and we introduced an unusual dataset (unusual in this

literature) to complement the common tools. We are currently analyzing administrative data on marriage for an entire population, not a sample, to understand men's choice of spouses when men are unconstrained by women's sexual strategies. Big data, exemplified by Google, provide another opportunity to unobtrusively observe mating behaviors. The ubiquity of CCTVs in large cities offers another opportunity. We hope that future researchers expand the toolbox in evolutionary psychology to better understand human mating. When sawing is needed, having only a hammer limits the craft.

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