Vertical differentiation or offsetting behavior: screening in commercial sex markets *

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Abstract

Prostitutes face significant risks from sexually transmitted infections, potential abuse from clients and risk of arrest by law enforcement. We document and examine a unique and unstudied phenomena wherein some prostitutes mitigate these risks through the request of networked references from new clients prior to the exchange of sex services. We posit that networked references could either lead to risker (offsetting) behavior due to the increase in safety or be used to further vertically differentiate providers. We test the theoretical predictions of each explanation empirically using a unique cross-sectional sample of internet-mediated prostitutes and find that providers who use networked references are less inclined to take on riskier behaviors. We find that those who use networked references engage in sex services with fewer clients, spend more time with each client and obtain higher weekly earnings than those prostitutes who do not use networked references. We conclude that networked references are used as tools by sex workers to vertically differentiate, not to offset less risky behavior.

Key Words: prostitution, differentiation, law enforcement

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1 Introduction

Prohibited sex work is and has always been a very dangerous occupation.[1] It is associated with higher risks of homicide, arrest, STIs, diminished social capital, and foregone marital opportunities.[2] Lowman and Fraser (1995) estimate that a female street prostitute is 60 to 120 times more likely to be murdered than a non-prostitute. Between 1981 and 2002, 2.7% of all female homicide victims in the United States were prostitution related deaths.[3]

But not all women who work as prostitutes face the same risks of arrest and death. For example, Brewer et al. (2006) found that historically, street prostitutes were the most likely form of prostitute to be victimized by clients. The Internet has displaced some street markets by shifting solicitation indoors where it is safer, but some women continue to take on significant risks (Cunningham and Kendall, 2011*a*,*b*).

We present new evidence on a previously unknown practice among contemporary sex workers which we call *networked references*. Networked references are used by some sex workers to screen a new client. The practice entails a new client assuring a sex worker he is a legitimate client (as opposed to an unreliable client, a violent male or

[1] Julissa Brisman was a 26-year-old self-employed masseuse who posted an advertisement to the now-defunct "erotic services" section of Craigslist. In April 2009, a man answered her advertisement and arranged to meet her at a hotel. When she arrived at the hotel room, the man robbed, attacked and fatally shot her. Within a week of Brisman's murder, police arrested Philip Markoff, a 24-year-old Boston University medical student, who was dubbed by the media the "Craigslist Killer". Markoff was accused of assaulting two other prostitutes in the same time period as Brisman's murder. He committed suicide while awaiting trial.

[2] Rao, et al (2002) and Gertler, Shah and Bertozzi (2005) showed that prostitutes receive compensating differentials in higher wages for riskier sex services, such as unprotected sex. Edlund and Korn (2002) present a theory of prostitution linking wages to foregone marital opportunities. In Giusta, et al (2009), the authors incorporate endogenous reputational feedback, or "stigma", into the market for commercial sex.

[3] Of this period, Brewer et al. (2006) wrote,"Lone perpetrators accounted for the overwhelming majority of prostitute and client homicides. In these data sets, clients committed 57-100% of prostitute homicides, prostitutes committed 86-94% of client homicides, and pimps committed 40-67% of pimp homicides. Serial [killers] of prostitute homicide killed more than one-third of prostitute victims, and nearly all such serial [killers] were clients."

a police officer) by providing the contact information of another sex worker(s) he has visited recently. The escort attempts to verify the legitimacy of the prospective client by contacting those escorts. If she knows the escorts used in the reference, then she simply contacts her associates to verify the prospective client's legitimacy. But if she does not know the escorts, she usually contacts these unknown escorts directly while also trying to independently verify that the reference is a legitimate sex service provider. The most effective way of determining the legitimacy of the referring escort is to read her reviews online at reputation-based websites such as *The Erotic Review*.[4] While not perfect, many prostitutes believe they can reasonably discern the authenticity of the referring escorts and the client by reading the reviews of each person and following the trails of those reviewers. Many prostitutes believe that they can detect the difference between authentic reviews and planted reviews by law enforcement.

In this research we present evidence from a survey of prostitutes on this practice. We find that 54.9% of contemporary sex workers with an Internet presence require new clients to provide networked references before they are willing to meet. Women who use references had higher weekly earnings, saw fewer new clients, and were more likely to offer romantic services to clients. Higher weekly earnings occured primarily through spending 32% more minutes with clients. Additionally, these women participate in safer sex practices, indicating that they have a lower risk threshold. We argue that networked references are more consistent with a vertical differentiation phenomena wherein the sex worker differentiates herself, specifically targeting clients that are interested in a more romantic sexual service, which they are willing to pay a premium to obtain.

[4] `www.theeroticreview.com`

The paper is organized as follows. Section 2 presents our theoretical explanations for networked referencess. Section 3 describes our data and methodology, and presents our analysis. Section 4 concludes.

2 Theoretical Explanations for networked references

To understand the potential explanations for the use of networked references we descriptively present two models. Specifically, models of offsetting behavior (Peltzman, 1975) and vertical product differentiation (Salop, 1979; Perloff and Salop, 1985; Sutton, 1986) offer predictions about provider behavior under different justifications for the use of references. We then contrast these models in order to define a set of expectations about potential differences in behavior that would explain whether references are used as a means of mitigating risk or in an effort to differentiate high end providers and clients that exhibit a higher willingness-to-pay for higher end sexual services.

2.1 Offsetting Behavior

When a person feels protected from adverse outcomes, they may offset that safety by taking on more risk. This has been called a *Peltzman effect*. Examples of offsetting behavior include increased vehicle accidents due to safer automobiles or reduced condom usage due to lower risks of HIV mortality (Peltzman, 1975; Lakdawalla, Sood and Goldman, 2006; Papageorge, Chan and Hamilton, 2016).

Sex work has historically had high rates of assault, STIs and homicide (Farley and Kelly, 2000; Brewer et al., 2006). New clients are uniquely risky because they are of an unknown type. They might be a reliable client, but they also might be an undercover police officer, an unreliable client, or a violent male. In order to mitigate the likelihood of

arrest or violence, sex workers may use networked references to determine a new client's intent. Upon submission of one or several references that the prostitute can vet, she is able to determine that the client has a lower likelihood of posing a threat to her.

If a networked reference has caused a prostitute to form *ex ante* beliefs that a new client is safe, then it has somewhat mitigated the *ex post* risk of abuse or arrest. As a result of this heightened safety, the prostitute should offset this safety by taking on higher risk behaviors with the new client. Specifically, the price of providing the services should remain constant, or perhaps even be lower, and the sexual acts performed should be riskier, such as reduced condom usage or nonstandard types of sex acts.

2.2 Vertical Product Differentiation

Sex acts are *experience goods*, as quality is somewhat unobservable *ex ante*. Quality is, however, not entirely unobserved; some crude signals of provider quality can be inferred.[5] Differentiation in contemporary sex services markets is based on previous experiences in the market, advertised services and quality, as well as information gathered from online reviews of previous customers. However, clients do not know their valuation of the experience prior to purchase. Instead, they receive a noisy but unbiased signal of the quality of each product based on online content such as actual advertisements, reviews of the service provider, as well as posted prices.

The use of networked references provides an opportunity for sex services to be further vertically differentiated. By requiring that clients submit networked references from a previous service provider, she might be able to discern the client's willingness-to-pay, reliabil-

[5]While the appearance of the service provider can be observed on the advertisement, it is often the case that providers use stock or inaccurate photos. Moreover, 6% of the transactions on *The Erotic Review* are reviewed as having a performance rating lower than a 3 on a 1-10 point scale, with 10 being the highest score. So, clients could glean insights about a provider from reviews by previous clients.

ity, attractiveness or grooming, and conduct. In order to attract the higher willingness-to-pay and higher quality clients, the prostitute must offer a higher quality service to justify the costly effort associated with obtaining a networked reference. As such, the use of the networked references as a tool to differentiate quality would predict fewer and lower risk acts to be performed, but higher prices among more attractive providers and clients.

Note that the vertical differentiation model explains variation in the riskiness of sexual acts performed across heterogeneous prostitutes. Specifically, higher quality prostitutes obtain a higher price with a reference relative to lower quality providers. Additionally, both high and low types of providers could attempt to increase the price received for sex services by taking on higher risk. However, given the lower willingness-to-pay for lower quality providers, lower effort levels (i.e. obtaining a networked reference) should be expected by clients to engage in such acts. Lastly, there is likely also a smaller density of higher quality providers relative to lower quality providers. Thus, lower quality providers need to take on riskier activities during an act in order to generate higher wages, whereas higher quality providers discern higher willingness-to-pay providers prior to engaging in the act.

2.3 Comparison of Theoretical Predictions

Comparing these two theories and the expected attributes and behavior associated with the provider and clients, there are a few main differences that we empirically examine. Potential differences could arise along five margins: price, number of clients serviced per week, risk of acts, quality of client and provider, and intimacy of the interaction.

In Table 1 we present predictions from the two models. Three potential predictions from the model are presented: *Higher*, *Lower*, and *Ambiguous*. *Higher* (*Lower*) indicates

that the attribute is more (less) likely to be present, while *Ambiguous* means that the explanation does not have a deterministic prediction. Prices are expected to be higher if networked references are being utilized to differentiate since higher willingness-to-pay clients are being identified by the higher quality providers. Since references increase safety according to the offsetting behavior theory, we expect more acts to be performed. However, the differentiation model does not generate a prediction about the number of acts.[6] The riskiness of acts is expected to be higher if networked references are used to mitigate risk, but not necessarily if references are intended to permit providers to differentiate themselves in the market. With regards to the quality of either clients or providers, we expect that both would be higher in the differentiation model, but not necessarily in the offsetting behavior model, since the providers are simply attempting to identify lower risk clients, not necessarily higher quality clients. Finally, given that offsetting behavior predicts that riskier behavior should be more permissible, we anticipate intimacy to be less likely. Alternatively, if both clients and providers differentiate themselves, then intimacy is more likely.[7]

3 Data and Methodology

We use the Survey for Adult Service Providers, a 2008-2009 convenience sample of prostitutes who were reviewed at the popular website, `www.TheEroticReview.com`. The Survey for Adult Service Providers (SASP) is described in detail in Cunningham and Kendall (2011*b*). SASP is structured into two datasets: (a) a sex worker-level static dataset

[6]On the one hand, vertical differentiation is associated with higher prices. And the higher prices would reduce quantity demanded. But, vertical differentiation is also associated with higher quality, which increases demand, and therefore increases quantity demanded. Thus, it's not possible to say theoretically what effect vertical differentiation has on the number of sex acts provided.

[7]In fact, an intimate sexual experience is a specific service that is offered by providers, which is referred to as the *GFE*, or girl-friend experience.

with personal characteristics and general business practices, and (b) a session-level panel dataset containing information on each of the last five client sessions. Our panel dataset contains information on session prices, sexual activities, and client characteristics. The provider file includes 685 respondents, while the session file contains information on 2,047 transactions. The survey instrument is provided in the appendix.

We estimate models of the following form:

$$Y_i = \beta_1 R_i + \beta_2 ID_i + \beta_3 R_i \times ID_i + \gamma X_i + \tau_t + \sigma_s + \varepsilon_i \tag{1}$$

where Y_i is the outcome of interest indexed by an individual respondent i, R_i is a dummy variable indicating whether the respondent uses networked references before meeting with a new client, ID_i is a dummy for whether the provider used any other source to identify the client,[8] $R_i \times ID_i$ is the interaction of the networked reference and identification, X_i is a matrix of exogenous provider-specific characteristics, τ_t is a month of year dummy, σ_s is a vector of state fixed effects and ε_i is the disturbance term.[9] We estimate equation (1) using OLS for linear and continuous variables and Poisson for count variables. We correct for heteroskedasticity in our provider-specific regressions, and cluster at the provider level for our transaction-specific regressions.

3.1 Results

Tables 2 present summary statistics of provider depending on whether the provider used networked references exclusively, other identification techniques exclusively, both identi-

[8]There are multiple ways in which women in our data set attempt to confirm a client's identity. These include doing background checks, googling his name, calling him at work, using her intuition, and checking whether he appears in the Room Service 2000 database.

[9]Exogenous provider characteristics include years of schooling, years of experience, parental years of schooling, marital status, BMI, race, a self-employed dummy, and the number of children.

fication and references, or none of these identification techniques. A few empirical regularities are worth noting. Only 5% of our sample use networked references exclusively. The modal prostitute uses references in combination with verification methods. Fifteen percent use verification methods only, and 30% use nothing to screen a new client.

In Table 2, we also see that references are very common among White service providers. In fact, among those who reported using networked references, 98% were White providers. However, when we examine the distribution across providers using both references and ID, only ID, or none of these screening mechanisms, the breakdown of ethnicity is similar, with approximately 60% of the providers in each of these groups being White. These groupings also significantly differ by the number of clients seen per week. Those using any screening mechanism average 2-3 clients per week, whereas providers that do not use any of these mechanisms average over 5 clients in the last week. Additionally, providers that do not use any screening mechanisms saw over twice as many new clients. But, individuals not using any screening mechanism do not make more money per week than those using either ID or ID and reference verification measures. Finally, providers using references are much more likely to be married.

Table 3 provides summary statistics for transaction characteristics based on whether the provider used verification techniques or not. Interestingly, the hourly compensation, age, regularity of the client, use of a hotel and provision of a massage are nearly identical whether a provider used a screening mechanism or not. However, certain aspects of these transactions are significantly different between providers using screening mechanisms and those that do not. First, providers using a screening mechanism are, on average, much more likely to French kiss a client. Second, those providers that used a networked reference

are, on average, less likely to have sexual intercourse without a condom. These behavioral findings indicate that providers using networked references appear to be offering safer, but more sensual sexual services.

We supplement these unconditional means with regression analyses that predict the probability of using a networked reference on provider specific attributes. The marginal effects of these results are presented in Table 4. As Table 2 indicated, White sex service providers (the omitted group) are significantly more likely to use networked references. Additionally, networked references appear to be more utilized by divorced service providers. Otherwise, none of the other attributes significantly explain the use of networked references. In the second column we examine those service providers that used both networked references and an identification mechanism, finding that years of schooling and concern about the likelihood of being arrested increased the use of screening mechanisms, while paternal schooling decreased the likelihood that a screening mechanism was used. Finally, in the third column, we examine the likelihood that only verification screening mechanisms were utilized. We find that Asian and married service providers are more likely to use verification screening mechanisms, while lower than average BMI providers are less inclined to use these mechanisms. Lastly, it appears that those with higher concern about the risk of HIV infection actually utilize verification mechanisms significantly less. Across these three specifications we do not find a unifying theme for screening mechanisms. Instead, we find that mechanisms are specific for certain ethnicities of service providers, with White providers being most inclined to use networked references and Asians being more inclined to use verification techniques. Moreover, as seen in Table 5, we do not find statistically significant relationships between the likeli-

hood that a provider uses any of these screening mechanisms and their retirement plans or a separate, legal job. In fact, the only statistically significant relationship that we do find is that providers using only verification techniques are approximately 15% less likely to announce that they intend to retire in five years.

Having established which types of providers are utilizing screening mechanisms, we now turn our attention to determining the relationship between screening mechanisms, weekly labor supply and earnings. Table 6 presents the results of regressing each of the screening mechanisms on a variety of measures of labor supply and earnings, controlling for years of schooling, years of experience, parental years of schooling, marital status, BMI, race, a self-employed dummy, and the number of children. While we do not find a significant relationship between any of the mechanisms and the likelihood that a provider worked in the previous week, we do find that those using screening mechanisms saw significantly fewer clients, including new clients. Additionally, these providers serviced significantly fewer clients per day. However, those who used both references and verification techniques obtained approximately 40% higher weekly earnings than providers using neither of these screening mechanisms, while those only utilizing verification techniques earned almost 50% lower earnings than providers using none of these techniques. Given the evidence in Tables 4 and 6, we are finding that higher educated providers who are concerned about the likelihood of arrest are yielding higher weekly earnings for servicing the same number of clients relative to married and Asian providers, who tend to utilize verification techniques more exclusively.

While those using networked references and verification techniques are obtaining higher weekly earnings for less work, it could be the case that they are either higher quality than

the comparison group or that they are offering services that warrant higher pay. For example, there might be a compensating differential for providers that are providing riskier services, and this is being reflected in the weekly earnings premium that we established in Table 6. We explore this possibility in Table 7. Specifically, we examine the relationship between screening mechanisms and safe oral, vaginal and anal sex in the first three columns. In the 4^{th} and 5^{th} columns we explore unsafe oral sex and vaginal/anal sex, respectively. We do not find that any of these screening mechanisms are significantly driving the likelihood of any form of unsafe sexual intercourse. However, those providers that use networked references in their screening are significantly more likely to have safe oral or vaginal sex. In fact, they are 18-23% more likely to engage in safe vaginal sex and approximately 11% more likely to engage in safe oral sex. Thus, we do not find support for the notion that those using networked references are obtaining higher weekly earnings from taking on higher risk sexual activities.

To further explore what is explaining the differences in weekly earnings we examine the hourly wage of the providers, the length of sessions and the wage of longer sessions (those last longer than one hour) on the screening mechanisms in Table 8. Interestingly, although we learned from Table 6 that providers using networked references and verification techniques earn higher weekly income, this is not because they obtain a higher hourly wage. Instead, it appears that this is because they spend approximately 41% more time with clients than providers not utilizing screening mechanisms. However, all providers using any form of screening mechanisms appear to spend more time with clients. Moreover, when we condition on services that last longer than one hour, we find that the subset of service providers utilizing both types of screening mechanisms earn significantly higher

wages. Specifically, the hourly wage of those providers using both of these screening mechanisms is 25% higher than non-screening providers.

Since we have established that providers who screen clients take on lower risk sexual acts, have service sessions that last longer and are compensated higher for these longer lasting sessions, we believe that these providers are utilizing the screening tools as a form of product differentiation rather than to offset concerns about law enforcement or dangerous clients. To further explore the service that is being offered by screening providers, we examine the relationship between the screening mechanisms and a variety of attributes of the service act. Specifically, the client's age, whether they are a regular customer, whether the service was provided at a hotel room, the provider's assessment of the attractiveness of the client, whether the provider and client are the same race, whether the client performed oral sex on the provider and whether the service involved French kissing. By examining the attributes of the services being offered, we are able to learn what appears to be driving the length and wage of the sessions upward. First, clients tend to be slightly older and more attractive for those using both types of screening. In addition, the clients are more likely to be regular clients. The sexual encounters are more likely to occur at hotels than at a personal residence. With regards to the interactions between the client and provider, we find that they are more likely to be the same race and that they are more likely to French kiss. Lastly, the client is more likely to perform oral sex on the provider than would be the case for a provider that does not use screening mechanisms.

Combining the results of Tables 6-9. we confirm that screening mechanisms, and particularly networked references, are being used to differentiate providers in order to obtain a higher wage. Relative to providers that are not utilizing screening mechanisms, those

that are using them perform fewer services per week, and these services tend to be for clients that the providers has previously serviced. Moreover, the services that are provided are significantly safer than those services provided by clients not utilizing screening mechanisms. Despite offering safer services, wages are consistently higher for those who screen. This turns out to be the case because providers that screen spend more time with the client. However, when we explore a bit deeper, the length of time appears to be a result of the provider offering a service that is typically referred to as the "Girlfriend Experience" in the sex services industry. It is so named because the service involves the provider and client performing sexual acts on one another as if they are simulating a non-market exchange relationship. Evidence of this service can be found in Table 9 when clients performing oral sex on the provider and French kissing are significantly more likely than in non-screening sexual exchanges. Thus, we find support for networked references and other screening being consistent with vertically differentiating. However, the differentiation and subsequent price premium is not consistent with the norms associated with sex services (Ariely, 2008). In fact, clients appear to be paying a premium for the service providers to provide a more romantic, sensual experience that is consistent with a more "normal" sexual engagement rather than a paid service.

4 Conclusion

While labor economists have become increasingly aware of the importance of social and job referral networks in labor markets (Schmutte, 2015; Gee, 2017), less is known about the way in which these practices are used within the illicit sector. Our study is the first to both bring attention to a previously unknown practice in sex markets wherein prostitutes use

networked references and other screening mechanisms when matching with new clients, as well as describe the characteristics of the women who use these mechanisms. We posited that networked references could be utilized by sex service providers for one of two reasons: (1) to mitigate concern that a client either had the capacity to inflict harm on a service provider (physical or sexual abuse, transmit an infection, etc.) or was a police officer or (2) to vertically product differentiate themselves in order to obtain higher rents from providing sex services.

Overall we find evidence that the use of references is associated with an overall lower risk level. Providers who use screening mechanisms are less likely to engage in risky sexual behavior (i.e. sexual acts without a condom), but this does not come at a cost to them. In fact, they perform fewer acts and garner higher weekly income. As a consequence, their contribution to STI epidemics may be lower. In fact, their presence in the sexual network at all may inadvertently reduce the scale and scope of an epidemic by diluting the sexual network with lower risk activities (Kremer and Morcom, 1998). Efforts like the CEASE network - who push law enforcement to fous narrowly on the demand side of the sex services industry - should be made aware that this private mechanism is being used to generate public safety from within, rather than relying on outside law enforcement for safety.[10] The real risk may be among those women who *do not* use screening mechanisms such as networked references. The fact that these women believe their risks of arrest and HIV are lower than those who use references may indicate that the problem arises when women are sufficiently optimistic about the environment in which they operate, which leads them to take on substantial risks when working with new clients.

[10]See `https://www.ceasenetwork.org`

In addition to engaging in lower risk behavior, providers who utilize screening mechanisms are significantly more likely to have repeat customers that desire a service that involves a more romantic, longer sexual act. Notably, the clients are older and more attractive in the opinion of the service providers, and they are willing to pay a higher wage for service providers that will provide services lasting longer than one hour. Moreover, these services are consistent with the "Girlfriend Experience", where clients and providers behave like a romantically involved couple, French kissing and performing sexual acts on each other rather than the provider exclusively performing acts on the client or simply allowing the client to engage in anal or vaginal sex with the provider. It is this longer lasting, more romantic exchange that appears to be the product that is generating significantly higher wages for those providers that utilize the screening mechanisms.

Given that networked references appear to be used primarily to both mitigate risk and vertically differentiate, it is concerning that there still exist some women who do not use these practices at all. Approximately 45% of the women in our sample do not use networked references. This may be because, as we show, networked references are associated with fewer new clients. Because references are hurdles that new clients must overcome, they represent an additional cost to the transaction, and thus may reduce demand for the workers who use them. Thus references may be associated with lost revenue through lower volume, and some women simply may not be able to afford that. Thus they may forego the use of references in exchange for higher volume by taking on unknown new clients. But, since the sex worker who foregoes the use of networked references faces a higher risk for each new client, as well as sees more of them, this may suggest that these women are particularly vulnerable to assault and STI transmission.

They are more likely to engage in unsafe sexual practices, for instance, and appear to be in the sex market for longer stretches of time. The policy implications of our study suggest that networked references are associated with lower overall risks from a public health perspective, suggesting that law enforcement and support groups should focus efforts on women who are not currently using screening mechanisms.

Table 1 Theoretical Expecations of Service Providers and Clients

Attribute	(1) Offsetting Behavior	(2) Vertical Differentiation
Prices	Ambiguous	Higher
Number of Service Acts Performed	Higher	Ambiguous
Risnkiness of Acts Performed	Higher	Ambiguous
Quality of Service Provider	Ambiguous	Higher
Quality of Client	Ambiguous	Higher
Intimacy of Act	Lower	Higher

Higher predicts that the attribute is more likely, while *lower* implies less likely. *Ambiguous* indicates that the theory does not provide a deterministic prediction.

Table 2 Means of SASP provider characteristics by screening type

Variable	References only (0.05) Mean	SDev	References and Verification (0.50) Mean	SDev	Verification only (0.15) Mean	SDev	Nothing (0.30) Mean	SDev
White	0.98	(0.15)	0.59	(0.49)	0.61	(0.49)	0.61	(0.49)
Black	0.00	(0.00)	0.15	(0.36)	0.11	(0.32)	0.06	(0.24)
Asian	0.00	(0.00)	0.05	(0.21)	0.07	(0.25)	0.12	(0.33)
Hispanic	0.02	(0.15)	0.14	(0.35)	0.14	(0.34)	0.15	(0.35)
Other ethnicity	0.00	(0.00)	0.07	(0.26)	0.07	(0.25)	0.07	(0.25)
Exclusive verification	0.00	(0.00)	1.00	(0.00)	0.63	(0.48)	0.00	(0.00)
Planning to retire next year	0.57	(0.50)	0.73	(0.44)	0.74	(0.44)	0.80	(0.40)
Planning to retire in five years	0.27	(0.45)	0.31	(0.46)	0.31	(0.46)	0.32	(0.47)
Worked as sex worker in last week	0.80	(0.41)	0.76	(0.43)	0.76	(0.43)	0.77	(0.42)
Weekly earnings	802.81	(687.45)	2165.59	(5513.18)	2087.45	(4906.31)	2125.46	(3791.34)
Number of regular clients seen	2.45	(2.73)	2.14	(2.42)	3.05	(6.67)	5.08	(11.28)
New clients	1.03	(1.91)	1.75	(2.78)	2.58	(5.23)	4.59	(8.21)
Years of schooling	14.12	(1.82)	14.59	(1.56)	14.37	(1.60)	14.02	(1.56)
Enrolled in college	0.23	(0.43)	0.22	(0.41)	0.21	(0.41)	0.19	(0.40)
Years of experience	6.05	(5.47)	5.56	(4.55)	5.47	(4.71)	5.19	(4.92)
Age	28.66	(7.37)	28.40	(6.08)	28.23	(6.44)	27.82	(6.98)
Age-squared	874.22	(470.60)	843.31	(392.17)	838.08	(415.06)	822.41	(450.93)
At least one child	0.44	(0.51)	0.42	(0.49)	0.38	(0.49)	0.31	(0.46)
Never married	0.34	(0.48)	0.41	(0.49)	0.44	(0.50)	0.52	(0.50)
Widow	0.00	(0.00)	0.00	(0.05)	0.01	(0.07)	0.01	(0.11)
Divorced	0.24	(0.43)	0.19	(0.39)	0.17	(0.37)	0.11	(0.31)
Cohabiting	0.17	(0.38)	0.23	(0.42)	0.22	(0.42)	0.22	(0.42)
Married	0.22	(0.42)	0.10	(0.31)	0.11	(0.31)	0.11	(0.31)
Separated	0.04	(0.20)	0.06	(0.24)	0.05	(0.22)	0.03	(0.17)
Underweight	0.02	(0.13)	0.08	(0.26)	0.11	(0.32)	0.20	(0.40)
Normal BMI	0.62	(0.49)	0.66	(0.47)	0.63	(0.48)	0.55	(0.50)
Overweight	0.27	(0.45)	0.10	(0.31)	0.13	(0.33)	0.14	(0.35)
Obese	0.04	(0.20)	0.13	(0.34)	0.10	(0.31)	0.06	(0.24)
Independent sex worker	0.93	(0.26)	0.96	(0.19)	0.93	(0.26)	0.85	(0.36)
Ever assaulted by a client	0.12	(0.34)	0.15	(0.36)	0.13	(0.34)	0.10	(0.30)
Chance of arrest, 1 to 10	3.43	(2.12)	4.26	(2.32)	4.08	(2.38)	3.77	(2.53)
Chance of friends finding out, 1 to 10	4.19	(3.50)	3.99	(3.08)	3.83	(3.01)	3.37	(2.72)
Chance of client violence, 1 to 10	3.97	(2.59)	4.50	(2.77)	4.35	(2.75)	4.08	(2.74)
Chance of HIV, 1 to 10	2.60	(1.92)	2.74	(2.02)	2.72	(2.05)	2.67	(2.14)
Imputed Years of Maternal Schooling	13.77	(2.39)	14.41	(2.25)	14.22	(2.26)	13.90	(2.23)
Imputed Years of Paternal Schooling	14.37	(2.46)	14.43	(2.36)	14.40	(2.38)	14.34	(2.42)

Survey for Adult Service Providers, or SASP, was a survey conducted from July 2008 to June 2009 of Internet service providers. Respondents were asked questions about themselves and, in a later section, about their five most recent transactions. This table is a summary of answers to questions about themselves. All sample statistics have been weighted using the inverse probability of appearing in the sample. The share of the sample that uses each screening method is shown in the column header (e.g., References only (0.05) means 5% of the sample uses references only).

Table 3 Summary statistics of SASP client-transaction characteristics by screening type

	References only		References and Verification		Verification only		Nothing	
Variable	**Mean**	**SDev**	**Mean**	**SDev**	**Mean**	**SDev**	**Mean**	**SDev**
Hourly compensation	321.41	189.46	334.97	188.96	302.19	188.25	303.24	189.07
Age of client	43.08	10.80	43.53	10.94	44.28	11.62	41.38	9.73
Session length (minutes)	122.95	350.39	141.74	417.90	122.40	245.46	82.14	211.90
Regular client	0.54	0.50	0.55	0.50	0.56	0.50	0.49	0.50
Appearance of client, 1 to 10	5.88	2.23	6.08	2.20	6.01	2.07	5.38	2.32
White client	0.80	0.40	0.80	0.40	0.82	0.39	0.78	0.41
Asian client	0.07	0.26	0.08	0.27	0.06	0.25	0.06	0.24
Black client	0.05	0.23	0.05	0.23	0.04	0.19	0.06	0.24
Hispanic client	0.04	0.19	0.03	0.16	0.03	0.17	0.06	0.24
Other ethnicity client	0.04	0.19	0.03	0.18	0.05	0.22	0.04	0.19
Second sex worker participated	1.06	0.23	1.08	0.27	1.04	0.19	1.03	0.16
Hotel assignation	0.46	0.50	0.50	0.50	0.42	0.49	0.40	0.49
Massage provided to client	0.36	0.48	0.36	0.48	0.37	0.48	0.37	0.48
Client was physically abusive	0.01	0.10	0.01	0.12	0.00	0.00	0.01	0.08
Client was verbally abusive	0.02	0.14	0.02	0.13	0.01	0.08	0.03	0.18
Filed police report	0.33	0.47	0.36	0.48	0.20	0.40	0.33	0.47
Kissed client, no tongue	0.59	0.49	0.67	0.47	0.57	0.50	0.43	0.49
French kissed client	0.56	0.50	0.63	0.48	0.57	0.50	0.41	0.49
Vaginal sex with condom	0.69	0.46	0.78	0.42	0.57	0.50	0.58	0.49
Fellatio with condom	0.31	0.46	0.35	0.48	0.28	0.45	0.24	0.43
Fellatio without condom	0.51	0.50	0.51	0.50	0.50	0.50	0.53	0.50
Anal sex with condom	0.05	0.22	0.06	0.23	0.03	0.18	0.05	0.21
Sex without a condom	0.05	0.22	0.03	0.17	0.08	0.28	0.08	0.28

Survey for Adult Service Providers, or SASP, was a survey conducted from July 2008 to June 2009 of Internet service providers. All sample statistics have been weighted using the inverse probability of appearing in the sample. Each respondent was asked about the last five clients she'd seen, and therefore the information in this table represents those client-transaction characteristics.

Table 4 OLS estimate of demographic characteristics of prostitutes who use letters of reference and verification methods

Dependent Variables	Letters only	Letters and verification	Verification only
Asian	-0.076*	0.039	0.260**
	(0.041)	(0.149)	(0.121)
Black	-0.070**	0.071	0.022
	(0.032)	(0.109)	(0.052)
Hispanic	-0.099***	-0.160	-0.003
	(0.037)	(0.121)	(0.064)
Other Race	-0.118***	0.002	0.048
	(0.039)	(0.102)	(0.084)
Years of schooling	-0.007	0.039*	-0.011
	(0.009)	(0.021)	(0.011)
Years of experience	0.002	-0.002	-0.000
	(0.003)	(0.005)	(0.004)
Imputed Years of Maternal Schooling	-0.003	-0.001	0.008
	(0.005)	(0.014)	(0.009)
Imputed Years of Paternal Schooling	0.002	-0.025*	0.013
	(0.005)	(0.013)	(0.008)
Age	-0.006	0.002	-0.004
	(0.012)	(0.024)	(0.016)
Age squared	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
Currently Enrolled in College Courses	-0.019	-0.008	-0.022
	(0.031)	(0.100)	(0.051)
BMI < 18.5	-0.026	-0.040	-0.195***
	(0.030)	(0.113)	(0.055)
25≤ BMI <29.9	0.064	-0.058	-0.068
	(0.051)	(0.080)	(0.053)
BMI≥30	-0.029	0.070	-0.023
	(0.036)	(0.090)	(0.051)
Providers is Independent	-0.040	0.147	-0.078
	(0.066)	(0.122)	(0.119)
Unmarried, Cohabiting	-0.027	-0.077	0.066
	(0.036)	(0.083)	(0.055)
Divorced	0.063*	0.118	0.004
	(0.038)	(0.078)	(0.045)
Separated	0.004	0.219	-0.004
	(0.047)	(0.147)	(0.068)
Married, Cohabiting	0.045	-0.048	0.141**
	(0.045)	(0.100)	(0.064)
Widow	-0.120	-0.294	-0.167
	(0.116)	(0.269)	(0.120)
Any Children (Y/N)	-0.019	-0.055	0.006
	(0.034)	(0.074)	(0.047)
Likelihood of HIV Infection (Scale of 1 to 10)	0.004	0.013	-0.019**
	(0.005)	(0.013)	(0.009)
Chance of Arrest (Scale of 1 to 10)	0.001	0.022*	-0.012
	(0.005)	(0.012)	(0.008)
Concerned of Client Violence (Scale of 1 to 10)	0.001	-0.003	-0.008
	(0.005)	(0.012)	(0.007)
Concerned about Discovery (Scale of 1 to 10)	0.001	0.004	0.007
	(0.004)	(0.010)	(0.006)
N	536	536	536
Mean of dependent variable	0.046	0.566	0.138

Model estimated with OLS. Robust standard errors in parenthesis. Survey sampling weights used in all models. * p<0.10, ** p<0.05, *** p<0.01

Table 5 Estimating the effect of letters of reference on retirement plans

Dependent Variables	Retirement		
	Next year	Five years	Legal job
Letters only	-0.199	0.021	0.087
	(0.130)	(0.119)	(0.135)
Letters and Verification	0.060	0.028	0.123
	(0.060)	(0.075)	(0.088)
Verification only	-0.106	-0.150*	0.000
	(0.089)	(0.085)	(.)
Covariates	Yes	Yes	Yes
State FE	Yes	Yes	Yes
Month FE	Yes	Yes	Yes
N	535	533	534
Mean of dependent variable	0.778	0.304	0.462

All models estimated with OLS. Robust standard errors in parenthesis. Survey sampling weights used in all models. * p<0.10, ** p<0.05, *** p<0.01

Table 6 Estimating the effect of letters of references on weekly labor supply and earnings

Dependent Variables	Worked in last week	Total clients	New clients	Regular clients	Clients per day	Ln(Weekly earnings)
Letters only	0.023	-0.803***	-1.505***	-0.202	-0.531***	-0.368
	(0.113)	(0.267)	(0.353)	(0.284)	(0.180)	(0.237)
Letters and Verification	-0.015	-0.525***	-0.772***	-0.234	-0.419***	0.415***
	(0.054)	(0.141)	(0.163)	(0.165)	(0.096)	(0.132)
Verification only	-0.058	-0.514***	-0.705***	-0.265	-0.403***	-0.478*
	(0.082)	(0.193)	(0.225)	(0.217)	(0.139)	(0.259)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
N	536	533	531	531	391	388
Mean of dependent variable	0.741	4.156	2.024	2.140	1.551	7.186

Columns 1 and 5 estimated with OLS. Columns 2-4 estimated with Poisson. Robust standard errors in parenthesis. Survey sampling weights used in all models. * p<0.10, ** p<0.05, *** p<0.01

Table 7 OLS estimates of the effect of references on risky sex acts

Dependent Variables	Safe			Unsafe	
	Oral sex	Vaginal sex	Anal sex	Oral sex	Vaginal/anal sex
Letters only	0.078	0.234***	0.029	-0.036	-0.022
	(0.076)	(0.069)	(0.047)	(0.101)	(0.032)
Letters and Verification	0.109*	0.176***	0.021	0.010	-0.019
	(0.049)	(0.051)	(0.020)	(0.056)	(0.022)
Verification only	-0.003	0.004	-0.036	-0.113	0.017
	(0.071)	(0.073)	(0.032)	(0.076)	(0.029)
Covariates	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes
N	2183	2199	2220	2178	2239
Mean of dependent variable	0.831	0.702	0.057	0.521	0.051

All models estimated with OLS. Robust standard errors in parenthesis. Survey sampling weights used in all models. * p<0.10, ** p<0.05, *** p<0.01

Table 8 Estimates of the effect of letters of references on price and quantity

Dependent Variables	ln(Wage)	ln(Length)	ln(Wage)>60 min
Letters only	-0.172	0.231	-0.095
	(0.091)	(0.118)	(0.112)
Letters and Verification	0.053	0.410***	0.246**
	(0.054)	(0.064)	(0.082)
Verification only	-0.126	0.237*	-0.011
	(0.079)	(0.092)	(0.106)
Covariates	Yes	Yes	Yes
State FE	Yes	Yes	Yes
Month FE	Yes	Yes	Yes
N	2189	2246	841
Mean of dependent variable	5.629	4.297	5.475

All models estimated with OLS. Robust standard errors in parenthesis. Survey sampling weights used in all models. * p<0.10, ** p<0.05, *** p<0.01

Table 9 Estimates of the effect of letters of references on job amenities

Dependent Variables	Client age	Regular	Hotel	Client attractiveness	Same race	Cunnilingus	French kiss
Letters only	0.957	0.146*	0.171	-0.185	0.088*	0.244**	0.281*
	(1.613)	(0.061)	(0.090)	(0.341)	(0.039)	(0.079)	(0.115)
Letters and Verification	2.337**	0.058	0.118*	0.658**	0.045	0.208***	0.287***
	(0.799)	(0.037)	(0.053)	(0.209)	(0.028)	(0.048)	(0.053)
Verification only	1.055	0.013	0.019	0.415	0.118***	0.051	0.132
	(1.120)	(0.054)	(0.068)	(0.280)	(0.034)	(0.072)	(0.081)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2137	2256	2242	2195	2176	2202	2237
Mean of dependent variable	43.400	0.536	0.486	5.810	0.582	0.589	0.568

All models estimated with OLS. Robust standard errors in parenthesis. Survey sampling weights used in all models. * p<0.10, ** p<0.05, *** p<0.01

References

Ariely, Dan. 2008. *Predictably Irrational: The Hidden Forces that Shape our Lives*. Harper Collins.

Brewer, Devon D., Jonathan A. Dudek, John J. Potterat, Stephen Q. Muth, Jr. John M. Roberts and Donald E. Woodhouse. 2006. "Extent, Trends, and Perpetrators of Prostitution-Related Homicide in the United States." *Journal of Forensic Science* 51(5):1101–1108.

Cunningham, Scott and Todd D. Kendall. 2011*a*. "Prostitution 2.0: The Changing Face of Sex Work." *Journal of Urban Economics* 69:273–287.

Cunningham, Scott and Todd Kendall. 2011*b*. *Handbook on Family Law and Economics*. Edward Elgar chapter "Prostitution, Technology, and the Law: New Data and Directions".

Farley, Melissa and Vanessa Kelly. 2000. "Prostitution: a critical review of the medical and social sciences literature." *Women and Criminal Justice* 11(4):29–64.

Gee, Laura. 2017. "Social Networks and Labor Markets: How Strong Ties Relate to the Labor Market Using Facebook's Social Network." *Journal of Labor Economics* Forthcoming.

Kremer, Michael and Charles Morcom. 1998. "The effect of changing sexual activity on HIV prevalence." *Mathematical Biosciences* 151:99–122.

Lakdawalla, Darius, Neeraj Sood and Dana Goldman. 2006. "HIV Breakthroughs and Risky Sexual Behavior." *Quarterly Journal of Economics* 121(3):1063–1102.

Lowman, J. and L. Fraser. 1995. "Violence against persons who prostitute: The experience in British Columbia." Unpublished Manuscript.

Papageorge, Nicholas, Tat Y. Chan and Barton H. Hamilton. 2016. "Health, Risky Behavior and the Value of Medical Innovation for Infectious Disease." *Review of Economic Studies* 83(4):1465–1510.

Peltzman, Sam. 1975. "The Effects of Automobile Safety Regulation." *Journal of Political Economy* 83(4):677–726.

Perloff, Jeffrey M. and Steven C. Salop. 1985. "Equilibrium with Product Differentiation." *Review of Economic Studies* 52(1):107–120.

Salop, Steven C. 1979. "Monopolist Competition with Outside Goods." *Bell Journal of Economics* 10:141–156.

Schmutte, Ian M. 2015. "Job Referral Networks and the Determination of Earnings in Local Labor Markets." *Journal of Labor Economics* 33(1):1–32.

Sutton, John. 1986. "Vertical Product Differentiation: Some Basic Themes." *American Economic Review* 76(2):393–398.