Unsafe Sex in the City: Risk Pricing in the London Area

Alexander Muravyev
National Research University Higher School of Economics (St. Petersburg campus) and Institute of Labor Economics (IZA)
and
Oleksandr Talavera*
Swansea University

Current draft: March 12, 2018

The standard disclaimer applies. We are grateful to Marina Della Giusta, Melanie Khamis, Peter Moffat, seminar participants at the University of Sheffield, University of Durham, University of Reading, and University of East Anglia, as well as participants of the European Economic Association meeting in 2013 for their valuable comments and suggestions. We would also like to thank Joo Young Jeon for her excellent research assistance. The views expressed here are solely those of the authors and not necessarily those of the IZA, NRU Higher School of Economics or Swansea University.

* Corresponding author. Address: School of Management, Swansea University, Fabian Way, SA1 1EN, UK. E-mail: o.talavera@swansea.ac.uk

Unsafe Sex in the City: Risk Pricing in the London Area

Abstract

This paper studies the incidence, determinants and pricing of unprotected oral sex in the London sex services market. The analysis is based upon matched sex worker-client panel data, which were collected from "field reports" on PunterNet.com website over the 1999-2009 time period. We find a steady increase in the incidence of unprotected oral sex during this period, rising from less than 20% to over 50% of all transactions. We show that the average premium for unprotected oral sex amounts to about 10-14% of the transaction price, and that this premium is higher if a sex worker has agency affiliation. Agency affiliated sex workers are also less likely to engage in unprotected oral sex compared to independent sex workers.

JEL: J46, J48, K42
Keywords: prostitution, unsafe sex, sex agencies, United Kingdom.

1 Introduction

In recent decades, the commercial sex industry has attracted considerable attention from scholars and policy-makers across the globe. Academic research has focused on the functioning of this particular market, e.g. on the supply and demand of sex services, price determination, the role of prostitution intermediaries, as well as the pros and cons of government regulation (e.g. Edlund et al., 2009; Farmer and Horowitz, 2013). Policy-makers' interest has largely been driven by public health concerns. Indeed, the commercial sex sector is one of the main channels for the spread of sexually transmitted diseases (STDs) including HIV (Simic and Rhodes, 2009; World Bank, 1999). Treatment of these diseases entails substantial costs to taxpayers: they exceed £700 million a year in the UK (Health Care Commission, 2007). Furthermore, there is evidence suggesting that the sector has been growing over the last decades. For example, surveys in the UK find that the percentage of males who paid for sex almost doubled between 1990 and 2000 (Ward et al., 2005).[1]

The economics literature studying the commercial sex sector is relatively new. A broad strand of this literature focuses on price determination in the sex market. Several studies find evidence of elevated pay in the sector and attempt to explain the "seemingly contradictory occurrence of free entry, low-skill requirements, and high wages" (Farmer and Horowitz, 2013). For example, a cross-country summary by Edlund and Korn (2002) points out high earnings in this sector worldwide, Moffat and Peters (2004) find that sex workers in the UK earn twice the average weekly wage of a non-manual female worker, whereas Edlund et al. (2009) report high wages for exclusive sex workers in the US. Two main explanations have been proposed as to why sex workers earn more than workers in traditional sectors. The first explanation emphasizes high opportunity costs due to foregone marriage opportunities (Edlund and Korn, 2002), while the second focuses on the stigma and reputation effects of both clients[2] and sex workers that are associated with sex services (Della Giusta et al., 2009; Della Giusta, 2010). These theories have been tested in several studies, obtaining mixed results (Arunachalam and Shah, 2008; Kotsadam and Jakobsson, 2014).

[1] See "It's all about what you want and when you want it", Guardian, 02 December 2005.
[2] For convenience, we use the term "client" to refer to men who engage in transactional sex-for-money with women.

Another stream of the literature studies the incidence of unprotected sex and the associated risk premium. For these studies, empirical contributions are usually based upon data from surveys of sex workers in developing countries. For example, using Mexican data, Gertler et al. (2005) find that sex workers receive a 23% premium for unprotected sex, which rises to 46% if the sex worker is regarded as attractive. Rao et al. (2006) report that Calcutta sex workers who always use condoms receive 66-79% less relative to those sex workers who engage in unprotected sex. In Ecuador, Shah (2013) reports that a one percentage point increase in the local STD rate increases the premium for unprotected sex by 28%. Gertler and Shah (2011) show for Ecuador that the regulation of sex work decreases the prevalence of STDs, as sex workers move from a riskier street environment into less risky brothels. Using data from 192 Western Kenyan sex worker diaries, Robinson and Yeh (2011) find that an unexpected income shock (e.g. illness of a family member of a sex worker) increases the probability of unprotected sex by 20.6%.

In the developed world, the evidence mainly comes from analyses of online markets for sex services. For example, Adriaenssens and Hendrickx (2012) study the online market in Belgium and Holland and find the premium for unprotected sex to be at about 6.5%. Egger and Lindenblatt (2015) use data from an online platform in Germany where sellers can advertise sexual services and either offer them as an auction or at a fixed price and estimate the risk premium at the level of 91% of the average hourly wage. In both developed and developing countries, the risk premium is typically estimated for unprotected sex in general, without differentiating between various types of sex services rendered.

A relatively new stream of the literature analyses the organization of the sex services sector. Although the topic has been touched upon in several earlier studies (e.g. Edlund and Korn, 2002), Farmer and Horowitz (2013) have only recently asked the question of how the presence of intermediaries affects the economic rent of clients and the structure of the market. They show that different regulatory regimes, e.g. the legalization or prohibition of prostitution intermediaries, can affect the economic rent in non-trivial ways. The effects depend on the key function of intermediaries, such as information transmission or the regulation of supply to increase the market power of sex workers. Furthermore, Gertler and Shah (2011) find that government intervention has significant implications for public health. Specifically, they report that more frequent police raids in the illegal (street) sector in Ecuador result in reduced STD rates including those of syphilis, chlamydia, or gonorrhoea.

This article adds to the literature by focusing on risky behaviour in the sex market, namely unprotected oral sex, which is a widespread phenomenon worldwide. In particular, our study investigates the incidence, determinants, and pricing of unprotected oral sex in the context of a developed economy. We use a new dataset compiled from the online market (data from the PunterNet.com website) that contains field reports on female sex workers in the UK. The website provides a unique opportunity to collect matched client-worker panel data. Specifically, we know key characteristics of sex workers, reported by their clients; we know the types of transactions the workers and their clients engaged in, as well as the price of the sex services rendered. We focus on the London market, which provides the most detailed and reliable data, with a large number of multiple observations of sex workers and their clients. As a result, we are able to include sex worker and client fixed effects in the econometric models. Our data span 11 years and contain 3,877 observations with complete information.

Our key contribution stems from focusing on a particular type of risky behaviour in the market for sex services. To our best knowledge, we are among the first to directly estimate the premium for unprotected oral sex.[3] Notably, we do this in the context of the developed world, where the evidence regarding the commercial sex services sector is still scarce. Another contribution of our study relates to understanding the role of intermediaries in the sex market. We investigate whether agency affiliation of a sex worker affects the probability and associated premium for unprotected oral sex, which allows us to draw some policy conclusions. Most importantly, we contribute to the literature by incorporating sex worker and client fixed effects in the econometric models studied. Most previous research makes use of OLS or quantile regressions (e.g. Moffat and Peters, 2004) or is based upon specifications with sex workers fixed effects only (e.g. Gertler et al., 2005) and instrumental variables (e.g. Rao et al., 2003). Therefore, they typically fail to address the problem of unobserved heterogeneity among buyers and sellers of sex. We tackle this problem using specifications with worker and client fixed effects as well as two-way fixed effects.

[3] For example, the data used by Adriaenssens and Hendrickx (2012) contain three categories of sex without a condom: fellatio, vaginal penetration, and anal penetration. However, these three categories are merged by the authors into a single variable "unprotected sex". Although they note that unprotected oral sex absolutely dominates the other two categories, the estimates from their study cannot be interpreted as a premium for unprotected oral sex.

Our main results can be summarized as follows. First, we show a significant increase in the incidence of unprotected oral sex between 1999 and 2009, rising from less than 20% to over 50% of all transactions. The prevalence of unprotected oral sex is higher among older sex workers, those of non-British origin and those working independently (without an intermediary). Regarding price determination, we find significant effects of age, duration of the encounter and the variety of services provided. We estimate a premium for unprotected oral sex in London to be in the range of 10 to 14% of the transaction price. We also find some evidence that sex workers employed by an agency (compared to those working on their own) charge clients a higher premium for unprotected oral sex. This may be an important finding from a policy perspective. Indeed, agency affiliation of sex workers raises the price for unprotected oral sex and reduces its prevalence, which in turn means lower public spending on treating STDs.

The remainder of this paper is organized as follows. The next section provides the necessary background about the sex industry in the UK. Sections 3 and 4 describe the data and discuss econometric modelling issues, respectively. Section 5 reports the results and Section 6 draws some conclusions.

2 Prostitution in the UK

The prostitution industry is a non-negligible sector of the UK economy. According to the most widely cited estimates, this sector employs some 80,000 individuals (Kinnell, 1999). Recent estimates by the Office for National Statistics suggest that in 2009 the sector contributed £5bn or 0.4% to the country's GDP (Office for National Statistics, 2014). These numbers are likely to be underestimated as existing UK laws make much of the industry illegal and therefore hard to measure.

Indeed, current UK laws regulating sex activities are not straightforward.[4] By law, the act of exchanging sexual services for money is not a crime, although there are a number of illegal sex-related activities. In particular, soliciting in a public place, kerb crawling (slow driving in search for sex workers), pimping (receiving a share of sex-worker earnings in exchange for

[4] For detail, see Q&A: UK Prostitution Laws: http://news.bbc.co.uk/1/hi/uk/7736436.stm, accessed on October 1, 2017.

facilitation), and pandering (recruitment of sex workers) are criminal offences. Moreover, the law criminalizes buying sex from a person younger than 18 or buying sex from a person who has been "subject to force", as well as owning or managing a brothel (which is defined as more than one sex worker in a particular premise). However, sex workers can legally work alone. Alternatively, they could decide to work for agencies. In this case, agencies can provide marketing services (e.g. website advertising), apartments, and bargain on behalf of sex workers, retaining up to 50% of the income in return. Working for agencies may also provide extra protection for sex workers and improve their time management (as several clients with sex workers might be scheduled for the same apartment in different time slots). The latter fact also allows agencies to operate legally, since no more than one sex worker is present in a particular premise at a given time.

UK policy-makers are currently balancing between loosening and tightening control over the sex industry. On the one side, there are radical proposals to follow the policy of the Netherlands or Canada, which includes regulating off-street prostitution and allowing brothels. Supporters of this idea believe that this policy might reduce the risk associated with the profession. Alternatively, there is strong public opinion against brothel legalization, with some even calling for criminalizing paid sex under all circumstances. This follows the experience of Sweden, which appears to have been successful in diminishing the scope of problems related to prostitution, and particularly human trafficking.[5]

Academics have also contributed significant input to this debate. For example, Atkins and Bindel (2008) undertook a research project "Big Brothel: a Survey of the Off-Street Sex Industry in London", in which the authors recruited male friends and colleagues who telephoned brothels, advertised in local newspapers (even though brothels and the advertising of sex are illegal in the UK) and asked questions about available services and associated prices. The results of this exploration reported that at least 1,933 women worked in London's brothels at the time of the survey, with prices for vaginal sex starting at £15. Notably, a third of the brothels offered unprotected sex. This report has drawn considerable attention. A group of 27 researchers led by Teela Sanders and Belinda Brook-Gordon (UKNSWP, 2008) asserts that "... the report builds a damning picture of indoor sex work based upon data whose reliability and

[5] For details, see a note by Beatrice Ask, Sweden's Minister for Justice and Home Affairs, for CNN http://edition.cnn.com/2011/OPINION/03/31/sweden.beatrice.ask.trafficking/index.html, accessed on October 1, 2017.

representativeness is extremely doubtful and a methodological approach that would be considered unethical by most professional social researchers." Remarkably, this critical study discusses safer sex practices and points out "considerable awareness amongst sex workers". However, the response also acknowledges that a higher level of reported unprotected sex – compared to what is usually assumed – is related to the gap in the knowledge about the associated risk, as well as the high competition among sex workers.

3 Data

3.1. PunterNet.com

The main source of data for our study is the PunterNet website (www.punternet.com). It is the largest online sex market in the UK, listing thousands of sex worker ads and providing their clients with the opportunity to share and evaluate their experiences with sex workers. While the website provides information on UK-based sex workers, it is actually registered in California. One of the first pages of the website says:

"Welcome! This site was created to facilitate the exchange of information on prostitution in the UK. Here you will find information on where to find services, what to expect, legalities, etc. You will be able to read reviews of encounters with working girls and submit your own 'field reports'. This web site aims to promote better understanding between customers and ladies in hopes that everyone may benefit, with less stressful, more enjoyable and mutually respectful visits."

The service went online in January 1999. Between 1999 and 2011, approximately 105,000 reports were posted (although some became inactive over time). Overall, the clients spent about £13.5 million on the services with an average price of £125 per encounter (in nominal prices).

A typical report about an encounter includes information about the location, contact details of the sex worker, time and day of the visit, length of encounter, price paid, and recommendations for visiting this person by other users of PunterNet.com. Notably, there is detailed information about each worker (e.g. age, appearance, and nationality), her place, and extensive client reviews. In particular, the "Additional Comments" field provides details about the types of sex services for each observation, including oral sex, vaginal sex, anal sex, and cunnilingus.

While PunterNet welcomes the submission of all new reports, there are a number of cases when they could be rejected from being published online. In addition to various technical reasons (e.g. an invalid website URL), it is not allowed to post a field report if a monetary exchange did not take place or if the client had already submitted three reports on the same establishment within the last 90 days. Additionally, reports on male sex workers and reports of clients who mention unprotected vaginal or anal intercourse (regardless of whether these are actual occurrences or advertisements) are also declined. The latter restriction has important implications for our analysis: in what follows, we focus on unprotected oral sex (oral sex without the use of a condom).

Although unprotected oral sex is considerably less infectious compared to unprotected vaginal or anal sex, it can nevertheless transmit a number of severe infections, including chlamydia, gonorrhoea, genital herpes and even syphilis. Furthermore, Hawkins (2001, p.308) reports that "unprotected oral sex carries a risk for the transmission of HIV. Owing to the frequency with which it is practised and given the fact that those with the highest risk of acquiring HIV often have protected anal or vaginal sex, it is possible that it may lead to 6–8% of new HIV infections."[6]

3.2 The sample and data

We downloaded all available data from PunterNet in October 2009 and collected 51,956 field reports. These raw data have been processed and cleaned in several steps. First, we restrict our attention to London and thus only keep those reports that indicate "London", "Soho", or "Chinatown" in the "Location" field, which reduces the sample to 13,876 reports.[7] Second, we exclude observations with price per hour (duration) higher than £300 (4 hours) or lower than £60 (10 minutes). This filter removes abnormal cases when a client either leaves a sex worker's premises within a short period of time or hires a sex worker for a longer period of time (e.g. a night or even a few days). Next, we drop all observations of sexual transactions that did not involve oral sex. The reason for this is that, in PunterNet, this variable is key for identifying

[6] Some scholars, however, claim that unprotected oral sex is not risky in terms of HIV transmission when other exposures are excluded (e.g. Del Romero et al., 2002; Kerwin et al., 2011).

[7] A sensible restriction of the PunterNet data was necessary as most of the information downloaded from this resource had to be read and coded manually. Having considered several possibilities, we decided to focus on London, which is the most active sex industry market in the UK, including in terms of the number of reports by a particular client and/or on a particular sex worker. This ensures a significant number of multiple observations of sex workers and their clients, which is essential for our modeling strategy.

risky behaviour during the encounter. As mentioned previously, this website bans any posts that refer to unprotected vaginal or anal sex and only allows posts with unprotected oral sex. In any case, dropping the observations that did not involve oral sex should not be viewed as particularly binding as it removes less than 15% of the reports from the raw data. Finally, we drop all sex workers whose age and nationality cannot be identified from the "Her Description" part of the field reports. The reasons for these latter restrictions are given below.

The literature views a sex worker's age among the key determinants of her work in the market, including the type and price of services (Edlund and Korn, 2009; Arunachalam and Shah, 2008).[8] Omitting this variable from the analysis is fraught with biased and inconsistent estimates. We therefore pay special attention to collecting this information. As some reports do not identify the exact age of sex workers but rather provide an approximate estimate (e.g. early-twenties or late-forties), we recode early-, mid-, and late- to two digit numbers with the second digit ending 3, 5, and 7, respectively. Most importantly, we take advantage of multiple observations of the same person to correct inconsistencies in the age data. We drop observations when there is no chance of recovering the sex workers' age. In our view, there are no strong reasons to suspect sample selection here – missing comments by clients regarding the sex workers' age are likely to occur at random.

The sex workers' nationality/country of origin is another key variable in our study as it may affect their reservation wage, risk attitudes and types of services offered.[9] This variable is especially hard to ignore given the large number of immigrants working in the sector. For example, even before the 2004 enlargement of the EU, 25% of women working in flats, parlours or saunas and 33% of woman in escort agencies were from Eastern Europe (Dickson, 2003). Although the data allow us to identify the country of origin (or at least a region of origin) for most of the sex workers, we opt for the simplest classification that distinguishes between sex workers of British origin and those of foreign origin (as reported by the clients).

Overall, after the careful cleaning of the data we end up with variables characterizing the price of each transaction, duration of the encounter,[10] age, and nationality of the sex worker as well

[8] The importance of age is highlighted, for example, in Cunningham and Kendall (2011a) who even construct probability weights based on age and race characteristics of sex workers in North America.
[9] For example, the migration literature emphasizes lower reservation wages of immigrants coming from less developed countries (e.g. Amuedo-Dorantes and De la Rica, 2007).
[10] Using these two variables, we define the price per hour of sex services, which is a key variable in our analysis.

as her agency affiliation (for a specific transaction).[11] We also construct indicators of particular types of sex services: oral sex with a condom, oral sex without a condom, vaginal sex, anal sex, etc.[12]

Our final estimation sample contains 3,877 observations pertaining to 1,392 sex workers. Since PunterNet was first launched in 1999, the number of reports published in 1999 and 2000 was relatively small. Consequently, for each of these years we have less than 200 observations in the data. As this web-resource gained increasing popularity in the 2000s, the number of reports rose steadily. In our database, the largest number of observations – close to 600 – occurs in 2007. In both 2008 and 2009, it is close to 500 observations for each year.

3.3. Descriptive statistics

Table 1 reports descriptive statistics of the key variables used in the analysis. The average price per hour of service is £143 while the median price is £138.[13] The average duration of an encounter is 50 minutes (the median is 45 minutes). Interestingly, this is higher than the 30 minutes reported by Moffat and Peters (2004), who also used data from PunterNet. This discrepancy could be explained by the different geography of the two samples, as well as different periods of observation.[14] The average age of the sex workers sampled is close to 26 years, with the median being equal to 25 years. The share of encounters with sex workers of British nationality (as identified by the clients) is a mere 18%, highlighting the predominance of foreign sex workers in London. Slightly more than a half of the transactions reported, 52.5%, involve an intermediary (agency). Unprotected oral sex is reported in 44.4% of all cases. The most common type of services – vaginal sex – is observed in 94.2% of the transactions. Anal sex, kinky activities,[15] French kissing, and cunnilingus occur significantly less frequently, in 2.1%, 2.9%, 7.1%, and 15.8% of the transactions, respectively.

[11] This variable is constructed based upon the phone numbers that appear in the sex workers' ads. If several sex workers share the same phone number, we assume that they work for an agency.
[12] PunterNet allows collecting a richer set of variables, including the type of encounter (incall or outcall), body type (thin or obese) and breast size. However, this comes at the cost of a further loss of observations. In any case, we have tried to incorporate these additional variables into our analysis, but the main results stayed virtually the same as reported below.
[13] Here and later, all our price measures are CPI (Consumer Price Index) adjusted, with 2005 being the base year.
[14] Moffatt and Peters (2004) use data from 998 complete reports that were submitted between January 1999 and July 2000 and include transactions not only in London but in the whole UK.
[15] These include fetishism, sadomasochism, spanking, bondage or dominance.

Figure 1 shows the dynamics of key variables of interest. The evolution of the price per hour exhibits an upward trend between 1999 and 2003, a decline in 2004-2006, a sizeable increase in 2007, followed by a sharp drop in 2008-2009. The latter probably reflects the impact of the Great Recession on the market for sex services, in particular, an increased supply of sex services, which was mentioned by some scholars (Roberts et al., 2013). Interestingly, the share of transactions involving unprotected oral sex shows a strong upward trend over the period studied. While the share of such transactions was less than 20% in 1999, it rose to over 50% by 2009. The share of transactions involving an agency was growing steadily between 1999 and 2005, from 24% to 61% and stabilized at the level of 55% in subsequent years. The share of sex workers who are described as British by their clients is relatively stable and oscillates around 17%.

Table 2 provides pairwise correlations between the variables collected from the reports. All correlations that are statistically significant at the 1% level are marked with an asterisk. The price per hour is shown to be negatively correlated with both the duration of the encounter and the sex worker's age. The price per hour is positively related to agency involvement, the use of unprotected oral sex, and engaging in anal sex or kinky activities. Unprotected oral sex is positively associated with longer durations of the encounters, older sex workers, and transactions involving an agency. Unprotected oral sex is also more likely to occur in the transactions that involve anal sex, French kissing, and cunnilingus. Interestingly, sex workers who are described as British are less likely to get involved in unprotected oral sex compared to the other sex workers.

Table 3 provides descriptive statistics for the sub-samples of observations involving unprotected oral sex and those that report oral sex with a condom, which allows us to better gauge the differences between the two types of transactions. For most variables, the difference in the means by sub-samples is statistically significant. On average, the clients are likely to pay about £7 more if the service includes oral sex without a condom. Additionally, the duration of services involving unsafe oral sex is about 25 minutes longer. Unprotected oral sex occurs in 56% of the transactions that involve an agency and only in 50% of the cases when the sex worker is independent. Sex workers of British origin are mentioned in 23% of the transactions involving protected oral sex and only in 13% of the cases with unprotected oral sex.

4 Econometric Strategy

As our focus is on the determinants of unprotected oral sex and the associated risk premium, we consider two general econometric models. First, we run a logit regression where the dependent variable is a dummy for unprotected oral sex and the principal regressors include the characteristics of the sex worker and duration of the encounter (potentially important determinants as suggested by the descriptive statistics). The model is then extended to incorporate additional controls available in the dataset, namely the types of activities and price charged by the sex worker. Formally, we estimate the following model:

$$\text{Prob}\,(\textit{Unprotected oral}_{iwct}=1) = \Lambda(\alpha + \beta\cdot \textit{Duration}_{iwct} + \boldsymbol{Person}_{iwt}\cdot\boldsymbol{\Gamma} + \boldsymbol{Activities}_{iwct}\cdot\boldsymbol{\Delta} + \eta\cdot \textit{Price}_{w} + \mu_t) \qquad (1)$$

where field report i belongs to the transaction of woman w with client c in year t, variable $\textit{Unprotected oral}_{iwct}$ is a binary variable equal to one if unprotected oral sex took place in transaction i and zero if oral sex was protected, and Λ is the logistic distribution function. The list of main regressors includes the natural logarithm of the duration of encounter i (variable $\textit{Duration}_{iwct}$) and vector $\boldsymbol{Person}_{iwt}$, which contains the natural logarithm of age (variable *Age*), as well as binary variables for nationality (variable *British*) and agency affiliation (variable *Agency*) of sex worker w.

In addition, vector $\boldsymbol{Activities}_{iwct}$ contains control variables for the type of activities used in transaction i. It includes dichotomous variables for vaginal sex (variable *Vaginal sex*), anal sex (variable *Anal sex*), kinky activities (variable *Kinky*), French kissing (variable *French kissing*), and cunnilingus (variable *Cunnilingus*). We control for the price charged by sex worker w as it may encompass some of her unobserved characteristics. This variable ($\textit{Price}_w$) is represented by the natural logarithm of either the actual price per hour in transaction i or the average price per hour charged by sex worker w in all other transactions except transaction i.[16] Note that the continuous variables describing age, duration and price are logarithmized for consistency with the hedonic price models described below. Finally, we use time dummies (denoted μ_t) to control for possible time effects. The year 1999 is chosen as the omitted (base) category.

[16] The price per hour is calculated as the price per act in pound sterling divided by the duration of act in hours.

Second, to quantify the risk premium for unprotected oral sex, we use a version of the empirical specification that is commonly employed in the literature, the so-called hedonic price model (e.g. Moffat and Peters, 2004; Robinson and Yeh, 2011). The baseline model takes the following form:

$$\log(Price)_{iwct} = \theta + \nu \cdot Unprotected\ oral_{iwct} + \xi \cdot Duration_{iwct} + \boldsymbol{Person}_{iwt} \cdot \boldsymbol{\Sigma} + \boldsymbol{Activities}_{iwct} \cdot \boldsymbol{\Omega} + \tau_t + \varepsilon_{iwct} \quad (2)$$

Here, the dependent variable is log(*Price*), the natural logarithm of the price per hour expressed in pound sterling, adjusted for inflation. It is useful to note at this juncture that some researchers (e.g. Rao et al., 2003) use the natural logarithm of the average price per act charged by sex workers, although this measure could be sensitive to variations in the duration of the act.[17] The key coefficient of interest in this model is on the dummy for unprotected oral sex, ν, which we expect to be positive. The time dummies in model (2) are denoted τ_t. All the other variables are the same as in model (1).

As an extension of model (2), we follow the approach by Gertler et al. (2005, p. 528) who, in addition to OLS regressions, consider specifications with sex worker fixed effects that control for "bias from both unobserved sex worker heterogeneity and client selection based upon unobserved sex worker characteristics." Specifically, we add one-way fixed effects (pertaining to either sex workers or clients) or two-way fixed effects (for both workers and clients) to model (2). Formally we estimate:

$$\log(Price)_{iwct} = \theta + \nu \cdot Unprotected\_Oral_{iwct} + \xi \cdot Duration_{iwct} + \boldsymbol{Person}_{iwt} \cdot \boldsymbol{\Sigma} + \boldsymbol{Activities}_{iwct} \cdot \boldsymbol{\Omega} + \psi_w + \phi_c + \tau_t + \varepsilon_{iwct} \quad (3)$$

where ψ_w and ϕ_c account for sex worker and client heterogeneity and ε_{iwct} is the error term. In all models, we rely on standard errors clustered by worker-client interactions.

[17] We have also employed the natural logarithm of price per act and obtain quantitatively similar results. They are available upon request.

5 Results and discussion

Our main empirical results are shown in Tables 4-6. Table 4 contains the results of estimating logistic regressions for the use of unprotected oral sex. Table 5 reports estimates from hedonic price regressions. It includes a pooled OLS model as well as models with one-way (pertaining to either clients or sex workers) and two-way (pertaining to both clients and sex workers) fixed effects. Table 6 extends our hedonic price setup and reports the results for the sub-samples of independent and agency-affiliated sex workers. The latter exercise is intended to verify if the determinants of the price per hour are different between these two groups of workers.

Our baseline results regarding the determinants of risky behaviour (the use of unprotected oral sex) are shown in Table 4. They should be viewed as a natural extension of the correlation results in Table 2, as the coefficients reported in Table 4 do not necessarily have a causal interpretation. Column 1 reports the estimates from a parsimonious model, which only includes the duration of the encounter, the sex worker's age, nationality, and agency affiliation as regressors. Similar to the findings of the descriptive analysis, the estimates suggest that unprotected oral sex is more common in longer encounters and among sex workers of non-British origin. As before, sex workers' age does not matter – the associated coefficient is statistically insignificant. Interestingly, the coefficient on the agency affiliation dummy is now negative and statistically significant, implying that, *ceteris paribus*, agency-affiliated sex workers are about 9% less likely to get involved in risky behaviour. This is in sharp contrast with the correlation analysis reported in Table 2, where the unprotected oral sex dummy and agency affiliation dummy were positively correlated.

Column 2 of Table 4 shows the results of estimating a model with additional controls that indicate the types of activities during the encounter. The coefficients on the newly added variables are statistically significant (except the coefficient on the cunnilingus dummy), but the statistically significant factors are again different from those in the correlation analysis. In particular, the probability of unprotected oral sex is negatively related to the use of vaginal sex and kinky activities. Regarding the key regressors, the previously reported results are only marginally affected. When we add the price per hour as an additional control variable (Column 3), it has a positive and statistically significant coefficient. The other variables retain the same signs and statistical significance as in Column 2. The coefficient on the agency variable increases compared to that of the model in Column 2 (-0.178 vs. -0.111). As there is concern

about reverse causality between the price of transaction *i* and the use of unprotected oral sex in transaction *i*, Column 4 reports estimates for the average price per hour in all other transactions – excluding transaction *i* – pertaining to the same sex worker *w*. The estimates remain quantitatively similar to the results reported in Columns (2) and (3).

Overall, all four models show that agency affiliation is associated with a lower incidence of unprotected oral sex. Interestingly, this result is at odds with the descriptive statistics and correlation analysis discussed previously. Indeed, they suggested that agency-affiliated sex workers are more likely to engage in unprotected oral sex compared to independent sex workers. The implication is that simple correlations can be very misleading for making correct inferences regarding the functioning of the market for sexual services.

The results of estimating hedonic price regressions are reported in Table 5.[18] The OLS estimates (Column 1, the baseline) suggest that the price per hour is negatively related to the duration of the encounter and sex workers' age, which are common findings in the literature (e.g., Cunningham and Kendall, 2011b). In particular, the coefficient on age implies the elasticity of price with respect to age of about 0.2. The price paid is positively related to the use of unprotected oral sex, vaginal sex, anal sex, and kinky activities, as well as to agency affiliation. More specifically, the hourly price is 13.5% higher if the encounter involves unprotected oral sex. If there is vaginal penetration in addition to oral sex, the client pays about 8% more, on average. Anal sex and kinky services would cost the client 16% and 27% more, respectively. Finally, the price is 12.9% higher if a sex worker has agency affiliation. However, the sex worker's nationality is shown to be insignificant for price determination.

Columns 2-4 show the results of estimating models with one-way and two-way fixed effects. They account for unobserved heterogeneity at the level of clients (Column 2), sex workers (Column 3), and both (Column 4). The diagnostic tests show that fixed effects are jointly statistically significant at the 1% level. The model with two-way fixed effects has the highest adjusted R^2 (0.72) compared to the one-way fixed effect models (0.47 to 0.66) and OLS (0.16, as reported in Column 1). However, the drawback of two-way fixed-effects estimation is the

[18] We report cluster-robust standard errors with clustering by both clients and workers as implemented in ivreg2 (Baum et al., 2010) and reghdfe (Correia, 2017) routines available in Stata 15.0.

substantial drop in the number of observation as well as the inability to estimate coefficients on time-invariant explanatory variables (e.g. British origin).[19]

Column 2 shows the results of estimating the hedonic price model with client fixed effects. The explanatory power of the model increases considerably relative to the OLS model, with unobserved client heterogeneity accounting for over 30% of the variation of the price variable. Except for the vaginal sex variable, the regression coefficients retain the same signs and significance as in the OLS model. However, the elasticity of price with respect to age falls substantially, to about 0.12. The premium for unprotected oral sex decreases by almost 30%. Similarly, the agency premium drops by about 30%.

Column 3 shows the results of adding worker fixed effects to the baseline model in Column 1. Now the British origin dummy gets subsumed by the worker fixed effects. Moreover, age becomes collinear with the worker fixed effects and time fixed effects implying that the respective coefficient cannot be estimated consistently. We therefore drop the age variable from this model. Compared to the models in Columns 1 and 2, the economic and statistical significance of the various sexual activities decreases. Apparently, unobserved characteristics of sex workers are related to the types of services rendered as well as their pricing. Another explanation draws on the fact that the dataset contains many singletons (single observations of a particular sex worker), and these are dropped in the estimation. Nevertheless, the premium for unprotected oral sex does not fall and even increases slightly (as compared to the specification with client fixed effects). The agency premium drops slightly but remains statistically significant at the 1% level.

Finally, Column 4 shows the results of estimating the model with both client and worker fixed effects. The statistical significance of the coefficients decreases because of the correlation of unobserved heterogeneity of both clients and sex workers with the observed variables. This can also be due to the increased number of singleton observations, which are ignored in the estimation. However, the premium for unprotected oral sex remains positive and statistically

[19] Despite our focus on a large and liquid market (London), the data still contain more than 50% of singletons, that is, single observations of sex workers and clients. These are not used in the fixed effects models. Time-invariant regressors, such as British origin, are naturally dropped from the models with worker fixed effects.

significant in this specification, reaching the level of 0.140, which is above any of the previously reported estimates.

Summarizing the regression results shown in Table 5, we conclude that the estimates provide strong evidence of the risk premium associated with unprotected oral sex. The price of unsafe oral sex turns out to be about 10.5-14% higher compared to the price of safe oral sex. Relative to the average price per hour, which is close to £143, the average premium thus amounts to £15-20.

Importantly, these findings are broadly consistent with earlier studies of the risk premium for unprotected sex. In particular, our estimates are close to the premium of 6.5% reported by Adriaenssens and Hendrickx (2012) for unprotected sex in Belgium and Holland (however, these authors do not distinguish between unprotected oral, unprotected vaginal, and unprotected anal sex). Similarly to us, they collect data from online "field reports" in these two countries. Our estimates are more different from those obtained in developing countries. For example, Gertler et al. (2005) find that Mexican sex workers receive a premium of 23 to 46% for unprotected sex, while Rao et al. (2003) report a risk premium of 66 to 79% for Indian sex workers.

In addition to the risk premium, our analysis yields an interesting observation regarding the role of intermediaries in the sex market. First, we have seen that a sex worker's affiliation with an agency reduces the probability of unprotected oral sex by 11-18%[20] and second, that the presence of an agency in a transaction increases its price by 8-13%.[21] In order to better grasp the differences in pricing of sex services depending on agency affiliation, we run hedonic price regressions separately for the sub-samples of independent and agency-affiliated sex workers.

The results for the two sub-samples are shown in Table 6. Columns 1 and 2 provide OLS and client fixed-effects estimates for independent workers while Columns 3 and 4 show the results

[20] However, we cannot rule out the possibility that both agency affiliation and the propensity to engage in unprotected oral sex are partially driven by the sex worker's unobservables.

[21] The role of intermediaries has recently received increased attention. For example, Farmer and Horowitz (2013) develop a theoretical model to analyze how the presence of intermediaries, as well as their legal status, affects the functioning of the commercial sex market. Their study leads to a number of interesting insights. For example, a sex worker's affiliation with a brothel is a positive signal about her quality. As a result, both sellers and buyers in a high-quality (decease free) market benefit from the presence of agencies. In contrast, pimps, i.e. intermediaries operating in low-quality markets, do not provide signals about sex workers' quality.

for agency-affiliated ones.[22] The OLS and fixed-effects results suggest that the pricing of sex services in the two sub-samples is different. For example, the elasticity of price with respect to age is substantially higher for the independent worker sub-sample. Similarly, OLS results indicate that sex workers of British origin who work independently receive a premium while those who use an agency do not. Also, there is no premium for anal sex in the agency sub-sample. Interestingly, in terms of risky behaviour, unprotected oral sex is associated with a somewhat higher premium among agency-affiliated workers. The difference persists in all specifications that we have tried, albeit it is not always statistically significant at the conventional levels.

Overall, there is some evidence that clients pay a higher premium for uncovered oral sex if a sex worker is affiliated with an agency. This seems to be an interesting result from the policy perspective. It is consistent with the idea that the presence of agencies may increase the price of unsafe oral sex and thus reduce its incidence on the market. Indeed, as we have already seen in the logit models, agency-related workers are less likely to engage in such risky behaviour.[23]

Finally, two caveats are due. First, our analysis is based on the data collected from the Internet which may potentially overrepresent or underrepresent different segments of the market (e.g. street prostitution versus brothels), and therefore, it is not necessarily representative of the population of female sex workers in London. However, this is a typical problem in the studies of hidden populations, such as sex workers, for which random sampling is impossible (Heckathorn, 1997). Research based on alternative methods of data collection, such as snowball sampling, suffer a similar drawback. The main advantage of the chosen mode of data collection is the possibility to have information on both sex workers and their clients.

Second, the PunterNet website only provides information about a "softer" form of risky behaviour on the sex market, namely unprotected oral sex, and bans any postings involving (riskier) unprotected vaginal or unprotected anal sex. This is certainly a limitation, but not necessarily a very severe one. In particular, there is evidence that unprotected vaginal or anal sex is less common compared to unprotected oral sex in the UK sex industry (e.g. Groom and

[22] We do not consider worker fixed-effects specification because of the large number of singletons and the loss of one of the key variables, *British*.
[23] It should also be noted, that the presence of agencies has broader implications, not necessarily captured in our analysis. One aspect is the division of surplus between sex workers and intermediaries, which may affect the supply of sex services.

Nandwani, 2006). Nevertheless, we acknowledge that this aspect of risky behaviour may require a separate study based on other data sources.

6 Conclusions

For various reasons ranging from moral grounds to public health concerns, prostitution is an important issue in modern society. Policy responses to prostitution are remarkably different even in neighbouring countries. Some countries, like Sweden, take a tough stance by outlawing brothels and criminalizing paid sex in all circumstances, whereas others, like the Netherlands, opt for regulating off-street prostitution and licensing brothels. However, there is no coherent policy in many countries with respect to paid sex. In the UK, for example, individual sex workers are legal, while brothels, pimping, and pandering are criminalized.

Moral issues aside, a key concern directing government policy regarding the commercial sex sector is how to choose the best approach to reduce the incidence of unsafe oral sex, which is one of the channels for the spread of sexually transmitted diseases and HIV. Despite several policy initiatives to tackle prostitution, and unprotected sex in particular, having been proposed (see Cunningham and Shah, 2014; Bisschop et al., 2015; Immordino and Russo, 2015), there is still little systematic evidence of their effectiveness. The functioning of the market for sex services, let alone the effects of various regulatory interventions, is still poorly understood.

In this paper, we study the incidence, determinants, and pricing of unprotected oral sex in the London sex service market. We collect and process detailed information from the online sex market of London (www.punternet.com, previously studied in Moffat and Peters, 2004), which provides us with a unique dataset containing matched client-worker panel data with detailed characteristics of sex workers and transactions. Using these rich data and employing the tools of descriptive, statistical, and econometric analysis, we find a steady increase in the incidence of unprotected oral sex between 1999 and 2009, rising from less than 20% of all transactions in 1999 to over 50% by 2009. We also find that unprotected oral sex is related to the sex worker's age, origin, and agency affiliation. Importantly, agency affiliation turns out to be associated with a lower incidence of unprotected oral sex. Next, we quantify a risk premium for unprotected oral sex, which amounts to 10-14% of the price paid by the clients. We also show differences in the pricing of sex services between independent and agency-affiliated sex

workers. Specifically, we find that the premium for unprotected oral sex is higher if a sex worker is affiliated with an agency.

The results concerning the role of intermediaries in the market for sex services seem to be the most interesting and policy relevant. Our study shows that the presence of intermediaries increases the premium for unprotected oral sex and reduces the prevalence of this risky behaviour. In turn, this reduces the spread of STDs and consequently lowers the required spending for the medical treatment of these infections. Therefore, our results, while by no means conclusive, may indicate potential benefits, from the viewpoint of public health, of regulating and licensing commercial sex sector intermediaries in the UK as compared to the existing regulatory system.

References

Adriaenssens, J., and Hendrickx, J. (2012). "Sex, Price and Preferences: Accounting for Unsafe Sexual Practices in Prostitution Markets", *Sociology of Health & Illness*, *34*(5), pp. 665-680.

Amuedo-Dorantes, C., and De la Rica, S. (2007). "Labour market assimilation of recent immigrants in Spain", *British Journal of Industrial Relations*, *45*(2), pp. 257-284.

Atkins, H., and Bindel, J. (2008). "Big Brothel: A Survey of the Off Street Sex Industry in London". London: POPPY Project, EAVES Housing or Women.

Arunachalam, R., and Shah, M. (2008). "Prostitutes *and* Brides?", *American Economic Review: Papers and Proceedings*, *98*(2), pp. 516-522.

Baum, C.F., Schaffer, M.E., and Stillman, S. (2010). "ivreg2: Stata module for extended instrumental variables/2SLS, GMM and AC/HAC, LIML and k-class regression." Statistical Software Components S425401, Boston College Department of Economics.

Bisschop, P., Kastoryano, S., and Van der Klaauw, B. (2015). "Street Prostitution Zones and Crime". Institute for the Study of Labor (IZA) Working Paper 9038.

Correia, S. (2017). "reghdfe: Stata module for linear and instrumental-variable/GMM regression absorbing multiple levels of fixed effects." Statistical Software Components S457874, Boston College Department of Economics

Cunningham, S., and Kendall, T.D. (2011a). "Prostitution, technology, and the law: new data and directions", *Research handbook on the economics of family law*.

Cunningham, S., and Kendall, T.D. (2011b). "Prostitution 2.0: The changing face of sex work", *Journal of Urban Economics*, *69*(3), pp. 273-287.

Cunningham, S., and Shah, M. (2014). "Decriminalizing indoor prostitution: Implications for sexual violence and public health". National Bureau of Economic Research Working Paper 20281.

Della Giusta, M., Di Tommaso, M. L., and Strøm, S. (2009). "Who is Watching? The Market for Prostitution Services", *Journal of Population Economics*, *22*(2), pp. 501-516.

Della Giusta, M., Di Tommaso, M. L., Shima, I., and Strøm, S. (2009). "What Money Buys: Clients of Street Sex Workers in the US", *Applied Economics*, *41*(18), pp. 2261-2277.

Della Giusta, M. (2010). "Simulating the Impact of Regulation Changes on the Market for Prostitution Services", *European Journal of Law and Economics*, *29*(1), pp. 1-14.

Del Romero, J., Marincovich, B., Castilla, J., García, S., Campo, J., Hernando, V., and Rodríguez, C. (2002). "Evaluating the risk of HIV transmission through unprotected orogenital sex", *AIDS*, *16*(9), pp. 1296–1297.

Dickson S. (2003). "Sex in the City: Mapping Commercial Sex across London". London: POPPY Project, EAVES Housing or Women.

Edlund, L., and Korn, E. (2002). "A Theory of Prostitution", *Journal of Political Economy*, *10*(1), pp. 181-214.

Edlund, L., Engelberg J., and Parsons, C. (2009). "The Wages of Sin", Discussion Papers 0809-16, Columbia University.

Egger, P. H., and Lindenblatt, A. (2015). "Endogenous Risk-Taking and Physical Appearance of Sex Workers", *The European Journal of Health Economics*, *16*(9), pp. 941-949.

Farmer, A., and Horowitz, A. W. (2013). "Prostitutes, Pimps, and Brothels: Intermediaries, Information, and Market Structure in Prostitution Markets", *Southern Economic Journal*, *79*(3), pp. 513-528.

Gertler, P., Shah, M., and Bertozzi, S. M. (2005). "Risky Business: The Market for Unprotected Commercial Sex", *Journal of Political Economy*, *113*(3), pp. 518-550.

Gertler, P., and Shah, M. (2011). "Sex Work and Infection: What's Law Enforcement Got to Do with It?", *Journal of Law and Economics*, *54*(4), pp. 811-840.

Groom, T. M., and Nandwani, R. (2006). "Characteristics of men who pay for sex: a UK sexual health clinic survey", *Sexually Transmitted Infections*, *82*(5), pp. 364-367.

Hawkins, D.A. (2001). "Oral sex and HIV transmission", *Sexually Transmitted Infections*, 77, pp. 307-308.

Health Care Commission (2007). "Performing Better: A Focus on Sexual Health Services in England." London, UK.

Heckathorn, D. D. (1997). "Respondent-driven sampling: a new approach to the study of hidden populations", *Social Problems*, pp. 174-199.

Immordino, G., and Russo, F. F. (2015). "Regulating prostitution: A health risk approach", *Journal of Public Economics*, 121, pp. 14-31.

Kerwin, J. T., Foley, S. M., Thornton, R. L., Basinga, P., and Chinkhumba, J. (2011). "Missing safer sex strategies in HIV Prevention: A call for further research", *African Population Studies*, *25*(2), pp. 286–297.

Kinnell, H. (1999) "Sex Workers in England and Wales: Europap-UK Briefing Paper for Department of Health, National Sexual Health Strategy".

Kotsadam, A., and Jakobsson, N. (2014). "Shame on you, John! Laws, stigmatization, and the demand for sex", *European Journal of Law and Economics*, *37*(3), pp. 393-404.

Moffatt, P. G., and Peters, S. A. (2004). "Pricing Personal Services: An Empirical Study of Earnings in the UK Prostitution Industry", *Scottish Journal of Political Economy*, 51(5), pp. 675-690.

Office for National Statistics (2014). "Impact of ESA95 Changes on Current Price GDP Estimates", http://webarchive.nationalarchives.gov.uk/20160106135409/http://www.ons.gov.uk/ons/dcp171766_365274.pdf, accessed on October 1, 2017.

Rao, V., Gupta, I., Loskshin, M., and Jana, S. (2003). "Sex Workers and the Cost of Safe Sex: The Compensating Differential for Condom Use among Calcutta Prostitutes", *Journal of Development Economics*, 71, pp. 583-603.

Roberts, R., Jones, A., and Sanders, T. (2013). "Students and sex work in the UK: providers and purchasers", *Sex Education*, *13*(3), pp. 349-363.

Robinson, J., and Yeh, E. (2011). "Transactional Sex as a Response to Risk in Western Kenya", *American Economic Journal: Applied Economics*, *3*(1), pp. 35-64.

Simic, M., and Rhodes, T. (2009) "Violence, dignity and HIV vulnerability: street sex work in Serbia", *Sociology of Health and Illness*, *31*(1), pp. 1–16.

Shah, M. (2013). “Do Sex Workers Respond to Disease? Evidence from the Male Market for Sex”, *American Economic Review Papers and Proceedings*, *103*(3), pp. 445-50.

UK Network for Sex Work Project (UK NSWP), (2008). “An Academic Response to Big Brothel”.

Ward, H., Mercer, C. H., Wellings, K., Fenton, K., Erens B., Copas A., and Johnson, A. M. (2005). “Who Pays for Sex? An Analysis of the Increasing Prevalence of Female Commercial Sex Contacts among Men in Britain”, *Sex Transmitted Infections*, 81, pp. 467-471.

World Bank (1999). “Confronting AIDS: Public Priorities in a Global Epidemic”, New York: Oxford University Press.

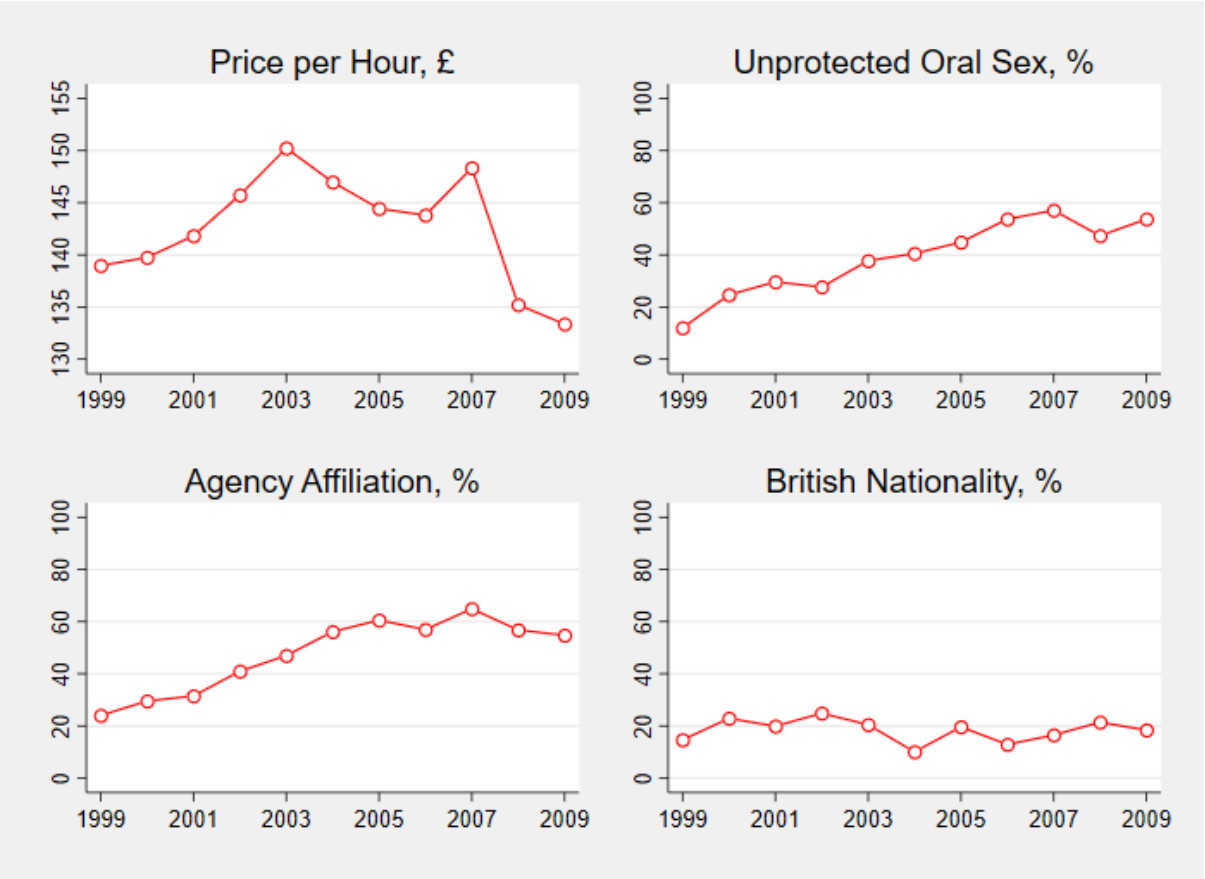

Figure 1. Dynamics of prices per hour, share of unprotected oral sex, sex workers with agency affiliation and sex-workers with British nationality.

Table 1. Descriptive statistics of the key variables.

VARIABLES	Definition	(1) mean	(2) sd	(3) p50
Price per hour	Hourly price in £	142.717	43.273	137.830
Duration	Duration in hours	0.830	0.499	0.750
Age	Age of sex worker in years	25.848	6.063	25.000
Agency	1 if a sex worker has agency affiliation, 0 otherwise	0.525	0.499	1.000
British	1 if a sex worker is mentioned as British nationality, 0 otherwise	0.183	0.387	0.000
Unprotected oral	1 if unprotected oral sex is mentioned in review, 0 otherwise	0.444	0.497	0.000
Vaginal sex	1 if vaginal sex is mentioned in review, 0 otherwise	0.942	0.234	1.000
Anal sex	1 if anal sex is mentioned in review, 0 otherwise	0.021	0.142	0.000
Kinky	1 if kinky services are mentioned in review, 0 otherwise	0.029	0.168	0.000
French kissing	1 if French kissing is mentioned in review, 0 otherwise	0.071	0.257	0.000
Cunnilingus	1 if cunnilingus is mentioned in review, 0 otherwise	0.158	0.365	0.000

Note: The sample size is 3,877.

Table 2. Correlations.

	Price per hour	Duration	Age	Agency	British	Unprotected Oral	Vaginal Sex	Anal Sex	Kinky	French Kissing
Price per hour	1.00									
Duration	-0.09*	1.00								
Age	-0.17*	0.07*	1.00							
Agency	0.15*	0.22*	-0.18*	1.00						
British	0.00	0.02	0.20*	0.07*	1.00					
Unprotected Oral	0.08*	0.41*	0.06*	0.06*	-0.12*	1.00				
Vaginal sex	0.03	0.11*	-0.10*	0.13*	-0.03	-0.01	1.00			
Anal sex	0.10*	0.07*	-0.01	-0.01	0.03	0.09*	0.01	1.00		
Kinky	0.15*	0.03	0.04*	0.06*	0.15*	-0.05*	-0.11*	0.09*	1.00	
French kissing	0.02	0.02	-0.07*	-0.03	-0.05*	0.14*	0.00	-0.00	0.05*	1.00
Cunnilingus	-0.02	0.08*	-0.08*	0.00	-0.04	0.06*	0.02	-0.01	-0.00	0.12*

Note: The number of observations is 3,877. Asterisk * denotes significance at the 1% level.

Table 3. Descriptive statistics by protected/unprotected categories.

	(1)	(2)	(3)	(4)	(5)
	Protected (N=2,157)		Unprotected (N=1,720		
VARIABLES	mean	sd	mean	sd	Diff.
Price per hour	139.65	43.89	146.56	42.19	-6.91***
Duration	0.65	0.41	1.06	0.51	-0.41***
Age	25.51	4.65	26.28	7.45	-0.77***
Agency	0.50	0.50	0.56	0.50	-0.06***
British	0.23	0.42	0.13	0.34	0.10***
Vaginal sex	0.94	0.23	0.94	0.24	0.00
Anal sex	0.01	0.09	0.04	0.19	-0.03***
Kinky	0.04	0.19	0.02	0.14	0.02***
French kissing	0.04	0.19	0.11	0.32	-0.07***
Cunnilingus	0.14	0.35	0.18	0.39	-0.04***

Notes. Diff is a t-test for mean comparison. Asterisks indicate significance levels: *** – at the 1%, ** – at the 5%, and * – at the 10%.

Table 4. Logit regressions for determinants of unprotected oral sex.

	(1)	(2)	(3)	(4)
Log(Duration)	0.558***	0.578***	0.630***	0.672***
	(0.024)	(0.025)	(0.026)	(0.032)
Log(Age)	-0.029	-0.018	0.070	-0.003
	(0.051)	(0.051)	(0.049)	(0.065)
British	-0.188***	-0.176***	-0.188***	-0.223***
	(0.023)	(0.024)	(0.024)	(0.028)
Agency	-0.132***	-0.111***	-0.178***	-0.174***
	(0.020)	(0.021)	(0.022)	(0.027)
Vaginal sex		-0.287***	-0.316***	-0.337***
		(0.039)	(0.036)	(0.040)
Anal sex		0.327***	0.250***	0.224***
		(0.057)	(0.071)	(0.076)
Kinky		-0.263***	-0.311***	-0.361***
		(0.032)	(0.026)	(0.028)
Cunnilingus		0.002	0.012	-0.014
		(0.027)	(0.027)	(0.032)
French kissing		0.324***	0.330***	0.369***
		(0.035)	(0.035)	(0.034)
Log(Price)			0.464***	
			(0.041)	
Log(Price other transactions)				0.306***
				(0.061)
Observations	3,877	3,877	3,877	3,001
Pseudo R^2	0.23	0.26	0.29	0.31

Notes: The number of observations is 3,877. The dependent variable is a binary variable for unprotected oral sex. Marginal effects around mean points are reported. The constant term and time dummies are included but not shown. Standard errors are clustered by worker-client interactions. Asterisks indicate significance levels: *** – at the 1%, ** – at the 5%, and * – at the 10%.

Table 5. Hedonic price regressions: OLS and FE Estimators.

	OLS	Client FE	Worker FE	Client-Worker FE
	(1)	(2)	(3)	(4)
Log(Duration)	-0.141***	-0.289***	-0.247***	-0.303***
	(0.018)	(0.020)	(0.017)	(0.025)
Log(Age)	-0.209***	-0.121***		
	(0.078)	(0.047)		
Unprotected oral	0.135***	0.105***	0.116***	0.139***
	(0.024)	(0.018)	(0.027)	(0.034)
Agency	0.129***	0.099***	0.080***	0.070
	(0.031)	(0.021)	(0.029)	(0.059)
British	0.018	0.004		
	(0.053)	(0.025)		
Vaginal sex	0.082***	0.047*	0.077**	0.056
	(0.030)	(0.024)	(0.034)	(0.042)
Anal sex	0.164**	0.177***	0.068*	0.100*
	(0.065)	(0.059)	(0.037)	(0.056)
Kinky	0.271***	0.193***	0.028	0.139**
	(0.051)	(0.045)	(0.031)	(0.061)
French kissing	-0.027	-0.032	0.005	-0.021
	(0.031)	(0.023)	(0.015)	(0.020)
Cunnilingus	-0.013	0.010	0.020**	0.002
	(0.020)	(0.016)	(0.009)	(0.016)
Observations	3,877	2,241	3,001	1,370
Adj. R^2	0.16	0.47	0.66	0.72

Note: The number of observations is 3,877. The dependent variable is the natural logarithm of price per hour, Log(Price). The constant term and time fixed effects are included but not shown. Two-way (client and worker) clustered standard errors are in parentheses. Asterisks indicate significance levels: *** – at the 1%, ** – at the 5%, and * – at the 10%.

Table 6. Hedonic price regressions: OLS and FE Estimators, agency subsamples.

	Non-Agency		Agency	
	OLS	Client FE	OLS	Client FE
	(1)	(2)	(3)	(4)
Log(Duration)	-0.161***	-0.326***	-0.107***	-0.235***
	(0.025)	(0.035)	(0.021)	(0.030)
Log(Age)	-0.222***	-0.134**	-0.110	-0.066
	(0.071)	(0.055)	(0.091)	(0.054)
Unprotected oral	0.124***	0.094***	0.144***	0.101***
	(0.034)	(0.031)	(0.025)	(0.023)
British	0.090**	0.044	-0.028	0.002
	(0.043)	(0.033)	(0.061)	(0.033)
Vaginal sex	0.118***	0.037	-0.011	0.052*
	(0.030)	(0.028)	(0.046)	(0.030)
Anal sex	0.301***	0.261***	-0.013	-0.013
	(0.071)	(0.073)	(0.067)	(0.055)
Kinky	0.273***	0.176***	0.250***	0.214***
	(0.078)	(0.057)	(0.070)	(0.075)
French kissing	-0.044	-0.059*	0.011	0.004
	(0.046)	(0.033)	(0.035)	(0.025)
Cunnilingus	0.001	0.035	-0.012	0.003
	(0.029)	(0.028)	(0.025)	(0.018)
Observations	1,840	967	2,037	1,018
R^2	0.20	0.63	0.15	0.67

Notes: The dependent variable is the natural logarithm of price per hour, Log(Price). The constant term and time fixed effects are included but not shown. Two-way (client and worker) clustered standard errors are in parentheses. Asterisks indicate significance levels: *** – at the 1%, ** – at the 5%, and * – at the 10%.