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Human Trafficking and Regulating Prostitution*

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Abstract

We study human trafficking in a marriage market model of prostitution. When trafficking is based on coercion, trafficking victims constitute a non-zero share of supply in any unregulated prostitution market. We ask if regulation can eradicate trafficking and restore the outcome that would arise in an unregulated market without traffickers. All existing approaches – criminalization of prostitutes ("the traditional model"), licensed prostitution ("the Dutch model"), and criminalization of johns ("the Swedish model") – fail to accomplish this goal, but we show that there exists an alternative regulatory model that does. Political support for regulation hinges on the level of gender income inequality.

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1 Introduction

According to the Global Slavery Index (2013), almost 30 million people live in contemporary slavery, many of whom are forced to work as prostitutes. Kara (2009) estimates that 600,000 individuals are trafficked each year for commercial sexual purposes within and across borders – which corresponds to about one woman or child every 60 seconds. Although the clandestine nature of trafficking renders such estimates imprecise (Weitzer, 2012), it is clear that human trafficking is an enormous problem, not just for the number of victims but for the deplorable conditions under which they are held captive.

While condemnation of sex trafficking is near universal, there is disagreement on how to address it. Because traffickers tend to elude direct prosecution, the search for means to fight trafficking recurrently morphs into a debate on whether prostitution should be banned.[1] To date, this debate remains unresolved.[2] The first point of contention concerns the *impact* of prostitution laws on trafficking. One side argues that legalizing prostitution facilitates sex trafficking, the other that a ban on prostitution is at best ineffective against traffickers. The second point of contention is a *conflict of interest*. Individuals that voluntarily sell sexual services argue that restricting prostitution to fight trafficking comes at their expense, forcing them underground and depriving them of opportunities to get health check-ups, organize, or seek help from the police. A Canadian court cited such concerns when it struck down a ban on brothels (Austen, 2012), as did a UN commission in its call to decriminalize prostitution worldwide (The Guardian, 2013).

The lack of agreement is reflected in the diversity of existing regulatory approaches, which include criminalization of prostitutes ("the traditional model"), criminalization of johns ("the Swedish model"), licensed prostitution ("the Dutch model"), and decriminalization. It does not help resolve the debate that top destination countries for sex trafficking span all standard regulatory approaches, except the Swedish one (see Table 1).

Despite the public discourse, there are few formal analyses that compare the merits and faults of these regulatory approaches.[3] The aim of this paper is to provide such an analysis

[1] According to the 2012 Trafficking in Persons Report by the U.S. Department of State, in 2011, 4,239 out of 7,206 suspects were convicted of trafficking worldwide, and 41,210 trafficking victims were identified. While these numbers are significant in absolute terms, they are small in comparison to the overall trafficking and slavery numbers.

[2] See, for example, Chuang (2010), MacKinnon (2011), The Economist (2013), the series of opinion pieces published under the heading "Is Prostitution Safer When It's Legal?" in the New York Times (2012), or the online debate on whether to legalize prostitution in The Economist (2010). The discourse on prostitution policy is old (see, e.g., United Nations, 1959), and in America dates back at least to colonial times (Woolston, 1921).

[3] In an early economic contribution, Reynolds (1986) describes the geographical variation found in prosti-

Country	Prostitution	Soliciting	Pimps/Brothels	Top
USA	Illegal (except Nevada)			Yes
Thailand	Illegal			Yes
Japan	Sale of coitus is illegal	Illegal		Yes
Israel	Decriminalized	Illegal		Yes
Italy	Decriminalized	Illegal		Yes
Spain	Decriminalized		Pimping illegal	Yes
Belgium	Legal and regulated		Pimping illegal	Yes
Netherlands	Legal and regulated			Yes
Germany	Legal and regulated			Yes
Turkey	Legal and regulated			Yes
Sweden	Purchase of sex is illegal		Illegal	No

Table 1: The table illustrates the variety of existing prostitution laws. In Nevada, some counties have adopted the Dutch model. The last column indicates whether the respective country is a significant trafficking destination.

in light of the aforementioned points of contention: Which approaches are effective against trafficking? And does the most effective approach necessarily pit the prevention of trafficking against the civil liberties of voluntary sex workers?

The distinctive feature of our analysis is the attempt to capture the intrinsic difference between voluntary supply and coerced supply.[4] To this end, we add traffickers to Edlund and Korn (2002)'s seminal theory of voluntary prostitution. Voluntary prostitutes decide to sell sex because the income from prostitution exceeds the income from alternative work and forgone marriage market opportunities.[5] They can be interpreted as "freely choosing" prostitution because it is lucrative, or as "being compelled" to sell sex by economic circumstances; the definition is that they are not forced into sex work by anyone else. By contrast, involuntary prostitutes are coerced into prostitution by traffickers who extort their income. The fundamental difference between voluntary and trafficked supply thus lies in the "produc-

tution markets and different legal regimes, which she terms the laissez-faire, control, and regulation regimes.

[4]Friebel and Guriev (2006) also consider a notion of coercion in their seminal analysis of human smuggling. In their model, illegal migrants may agree ex ante to temporary bondage at the destination as a "commitment" to repay human smugglers for financing their migration. In our analysis, it is crucial that traffickers do not transport individuals that voluntarily participate, but instead coerce the individuals into participation. All other theoretical analyses of sex markets focus on only voluntary prostitution (Edlund and Korn, 2002; Della Giusta et al., 2009), only trafficking (Akee et al., 2010), or only the demand side (Cameron and Collins, 2003; Collins and Judge, 2010), or model pimps as non-coercive agents (Farmer and Horowitz, 2013).

[5]Edlund et al. (2009) provide evidence from the U.S. upper-end escort market that the wage premium for prostitutes reflects forgone marriage market opportunities. The premium has also been linked to higher risk exposure or greater stigma than in alternative work (Rao et al., 2003; Gertler et al., 2005; and Levitt and Venkatesh, 2007; Arunachalam and Shah, forthcoming; Della Giusta et al., 2009). Robinson and Yeh (2011) provide evidence from Kenya that women increase their supply of commercial sex in response to negative income shocks. While we follow Edlund and Korn (2002), what matters for our analysis is that some factor underlying the wage premium does not directly affect traffickers.

tion" costs: The costs of voluntary prostitution are those borne by the prostitutes, including opportunity costs. In comparison, traffickers bear the costs of running their criminal activity but do not internalize the costs borne by their victims.[6]

This has implications for the relative magnitude of trafficked and voluntary supply under different conditions. It also has implications for the impact of prostitution laws because the inherent difference in production costs entails a difference in the extent to which the economic incidence of (the costs created by) criminalization falls on the two types of suppliers. Thus, voluntary and coerced supply differ inherently in their elasticity to criminalization.

The second distinctive feature of our analysis follows from the first. The existing literature on "illegal goods" – prostitution is often put in this category, alongside illicit narcotics and weapons – typically considers a government that wants to decrease consumption of the good in question (Becker, Murphy, and Grossman, 2006). The regulatory issue considered in this paper is different: We assume that the government does not want to reduce consumption per se, but instead one particular mode of supply. We hence ask not whether regulation can eliminate all prostitution, but rather whether it can eradicate trafficking without infringing on voluntary prostitution. In our analysis, none of the existing approaches accomplish this goal; they either fail to eradicate trafficking or do so at the expense of voluntary prostitutes. However, we discover a novel regulatory framework – which is a combination of two existing approaches – that would accomplish the goal.

Section 2 describes our basic model and analyzes its equilibrium in the absence of regulation. It shows that a decriminalized prostitution market in general accommodates some level of trafficking. Both the ratio of trafficking to voluntary prostitution and the total level of prostitution crucially depend on gender income inequality.

Section 3 analyzes the traditional model and the Swedish model, which are the two prototypical approaches to banning prostitution. We refute the "indirect taxation" argument for laws against prostitution, namely that costs imposed on sex transactions (the "final" good) are necessarily passed through to traffickers (the "intermediate" producers). On the contrary, we show that such laws *subsidize* traffickers at the expense of voluntary prostitutes so long as some prostitution is voluntary. Paradoxically, this means that laws against prostitution counteract laws against trafficking. Out of the two approaches to banning prostitution, the Swedish one dominates. Because it deters the side of the market where coercion is absent, it can in principle stifle the entire market and hence eradicate trafficking. By contrast, criminal penalties imposed on the supply side, as in the traditional model, weakly increase trafficking – not to mention the harm on trafficking victims.

[6] Acemoglu and Wolitzky (2011) model coercion in a principal-agent relationship as the principal's ability to lower the agent's reservation payoff and thus relax her participation constraint. Our model considers the limit case where principals (traffickers) are so coercive that they completely undo their agents' (victims') participation constraints, and hence internalize none of their opportunity costs.

Section 4 examines the Dutch (Nevada) model. This model expressly acknowledges the two types of supply, and attempts to separate them through occupational licensing: Only "good" (here, voluntary) suppliers obtain licenses, whereas "bad" (coerced) suppliers are prohibited from working.[7] We show that the Dutch model dominates both the traditional model and decriminalization. But it, too, fails to eradicate trafficking, which persists underground serving customers that do not care whether their counterparty is licensed. This is because occupational licensing is designed to protect consumers in voluntary markets (Kleiner and Krueger, 2013), but it is less suited for protecting suppliers from coercion, which is the main objective in the sex market. A comparison between the Dutch and Swedish models reveals a trade-off: The Swedish one is more effective against trafficking, but the Dutch one infringes less on voluntary prostitution.[8] Choosing between these two is thus a question of regulatory priorities.

We propose a new regulatory model: licensing prostitutes and then criminalizing johns that buy sex from unlicensed prostitutes. This model can both eradicate trafficking *and* restore the purely voluntary equilibrium that would emerge in an unregulated market without traffickers. It dominates the Dutch model because it deters illegal demand – which, unlike illegal supply, is completely voluntary. And it dominates the Swedish model because it neither infringes on voluntary supply nor needs to eliminate demand – it merely channels both into a legal market. Moreover, the new model faces the same implementation constraints as these two existing ones, which it is simply a combination of.

Section 5 studies extensions of our theoretical analysis that offer potential connections to empirical research.[9] Our analysis implies that, all else equal, trafficking flows to a region increase with its income and with its degree of gender income equality. At the same time, political support for laws against prostitution – in particular for the Swedish one – should also increase with those variables. Finally, in the presence of sex tourism, (a change in) one country's prostitution law affects trafficking flows also to other countries. We show that the impacts abroad can more than offset the domestic one. This suggests caution in drawing any conclusions about the impact of a law (change) from time series variation in the regulating country alone, or from a partial equilibrium interpretation of cross-country differences.

[7] Licensing is required in a wide range of occupations. Kleiner and Krueger (2013) estimate that about 30% of the U.S. labor force works in licensed occupations.

[8] A recent conference juxtaposed these models as "the two main legislative options to deal with prostitution based on opposing views of the system of prostitution" (European Women's Lobby, 2012).

[9] The empirical evidence on the relationship between prostitution laws and trafficking is inconclusive. Akee et al. (2010) find that laws against prostitution are not, or in some specifications negatively, correlated with the reported incidence of trafficking between pairs of countries. By contrast, Jakobsson and Kotsadam (forthcoming) and Cho, Dreher, and Neumayer (forthcoming) find that higher proxy measures of trafficking are associated with destination countries where prostitution is legal.

2 Unregulated prostitution

We build on a simplified version of Edlund and Korn's (2002) model of prostitution markets. There is a unit mass of females and of males. Everybody supplies one unit of labor, and there is an exogenous labor market in which men face a wage y and women a wage w.

Men and women interact sexually in two markets: First, there is a market for monogamous marriage. Men place a value k on marriage because it gives them access to offspring. To marry, a man must pay his wife a price of marriage, p_m. Women derive utility from offspring independently of marital status and do not care for marriage per se. Second, there is a market for commercial sex. Here, men can buy non-reproductive sex, which they value at e per unit. A prostitute uses her labor supply to sell a unit of sex at price p_s per unit but does not care for sex per se.

A woman can be either a wife working in the exogenous labor market or a prostitute, and she maximizes her total income.[10] A man spends all his income on extra-marital sex or marriage or both, and maximizes his consumption utility.[11] The equilibrium in the marriage and sex markets determines the prices, p_m and p_s, and the number, or fraction, of women who choose to be prostitutes, n. The following parametric assumption ensures positive prices and allows us to focus attention on interior equilibria (with corner solutions at the boundaries of the domain of ρ):

Assumption 1. $\sigma \equiv e/k > 1$ *and* $\rho \equiv y/w \in \left[\frac{1}{\sigma-1}, \frac{\sigma}{\sigma-1}\right]$.

Intuitively, σ gauges the value that men place on commercial sex relative to marriage and the above condition ensures that the demand for commercial sex is positive in equilibrium. In addition, ρ is a measure of gender income inequality, which affects women's career choices, and the above condition ensures that the supply of commercial sex is between 0 and 1.

[10] An article on Nevada's legal brothels illustrates that prostitutes are stigmatized in a manner that may make it hard for them to not only marry but even meet a prospective spouse (Ditmore 2009):

> Some counties and towns impose some extraordinary restrictions on commercial sex workers. The net effect of these regulations is to separate sex workers from the local community. Some jurisdictions require brothel prostitutes to leave the county when they are not working, while others take the opposite tack, forbidding them to leave the brothel where they work. Some do not allow the children of the women who work in the brothels to live in the same area.

[11] In Edlund and Korn (2002), a man spends all his income on sex or marriage, or both, and on consumption. For simplicity we dispense with his consumption, whose addition would not alter our main findings. For empirical support of the assumption that (also) married men buy commercial (extra-marital) sex, see, e.g., Farley et al. (2011), who analyze a sample of U.S. commercial sex buyers and find about half of all men who patronize prostitutes to be married.

2.1 Voluntary prostitution

Before introducing trafficking, we examine the competitive equilibrium of this basic model. In equilibrium, women are indifferent between being a wife and being a prostitute ((Ia)), men are indifferent between getting married and buying more sex instead ((Ib)), and all male income not spent on marriage is spent on sex ((Ic)):

$$\begin{aligned} p_s &= p_m + w && \text{(I}a\text{)} \\ p_s &= \sigma p_m && \text{(I}b\text{)} \\ (1-n)(y-p_m) + ny &= np_s && \text{(I}c\text{)} \end{aligned}$$

The indifference curves defined by (Ia) and (Ib) yield a unique solution for the prices of sex and marriage, p_s^f and p_m^f (see right graph in Figure 1).

Figure 1

Given the prices, the budget constraint (Ic) pins down a unique level of prostitution, n^f (see left graph in Figure 1).

Proposition 1. (Free equilibrium) *In the absence of trafficking, the equilibrium is* $p_s^f = \frac{w}{1-1/\sigma}$, $p_m^f = \frac{w}{\sigma-1}$, *and* $n^f = \rho - \frac{1}{\sigma-1}$.

The more men value marriage over sex (the lower is σ), the higher the price of marriage. Fewer women then choose prostitution. Moreover, the price of sex must also increase for any woman to voluntarily enter prostitution. (This is the central insight of Edlund and Korn (2002): The price of commercial sex reflects opportunity costs of forgone marriage opportunities.) Wages also play a central role. An increase in the female wage w makes marriage more attractive. This decreases the supply of prostitution and increases the price of sex. By contrast, an increase in the male wage y increases the demand for commercial sex, by both married and unmarried men, and hence increases the level of prostitution.[12] These two effects have the following implication (illustrated in the left graph of Figure 2):

Corollary 1. *Voluntary prostitution decreases with the male-female income ratio.*

Figure 2

Proposition 1 is the equilibrium outcome when everyone enjoys freedom of choice. We refer to this as the "free equilibrium."

[12] Edlund and Korn (2002) show that a rise in male income can decrease prostitution when child quality in marriage increases with investment in the child and hence the income pooled in marriage. We abstract from this aspect since we focus on trafficking, which unambiguously increases with male income. Indeed, as is clear from our results later, if a rise in male income were to reduce voluntary prostitution, it would increase trafficking even more.

2.2 Introducing trafficking

The 2000 United Nations Trafficking Protocol defines *trafficking* broadly as "the recruitment, transportation, transfer, harboring or receipt of persons by means of threat of force, fraud, deception, or the abuse of power." Trafficking does not necessarily imply cross-border transportation; in fact, estimates suggest that the majority of trafficking victims in the United States are abducted from within the country.[13] Here we consider "domestic" trafficking. We analyze cross-border trafficking in Section 4.1.

We assume that a trafficker bears a cost $c(n_t)$ per trafficked woman where n_t denotes the aggregate level of trafficking. We make the following assumption:

Assumption 2. *$c(\cdot)$ is differentiable, $c'(\cdot) > 0$, $c(0) = 0$, and $c(1) > y$.*

Implying decreasing returns to scale, $c'(\cdot) > 0$ ensures a solution for n_t that is continuous in all parameters.[14] One justification for $c'(\cdot) > 0$ is that competition and salience make it more difficult for each trafficker to find and procure victims. Further, $c(0) = 0$ and $c(1) > y$ rule out cases where no or all women are trafficked.

Trafficked (or involuntary) prostitutes sell sex at competitive prices but their revenues are extorted by their traffickers. We assume free entry into trafficking, so traffickers make zero profits in equilibrium: $p_s = c(n_t)$. We must further distinguish between the possibilities $n_t < n$ and $n_t = n$; in the latter case, all women strictly prefer marriage over prostitution (rather than being indifferent) such that the demand for commercial sex is met exclusively by trafficking. Thus, the equilibrium is determined by

Co-existence case	**Trafficking-only case**
(Ia) $p_s = p_m + w$	$p_s \leq p_m + w$ (Ia')
(Ib)	$p_s = \sigma p_m$
(Ic)	$np_s = (1-n)(y - p_m) + ny$
(Id)	$p_s = c(n_t)$
(Ie) $n_t < n$	$n_t = n$ (Ie')

I. Unregulated prostitution (decriminalization)

[13] The most common estimates cited by the media suggest that 100,000 to 300,000 children are at risk of being trafficked in the United States every year (Estes and Weiner, 2001). The *Village Voice* has contested this estimate, suggesting the number is as small as 827 children per year (Cizmar, Conklin, and Hinman, 2011). The *Village Voice*, however, is run by the owners of Backpage.com, a website that has been criticized for enabling the trafficking of underage girls (see, e.g., Kristof 2012a, 2012b).

[14] With non-decreasing returns to scale, trafficking would still be affected in a similar way by the various policies studied further below, with the difference that trafficking would "jump" between being profitable on a large scale to not being profitable at all.

Co-existence. Recall from Section 2.1 that (Ia)-(Ic) pin down the unique values p_s^f, p_m^f, and n^f. Substituting p_s^f into (Id) yields

$$c\left(n_t\right) = \frac{w}{1 - {}^{1}\!/_{\sigma}}. \tag{1}$$

To satisfy (Ie), the solution to this equation, $\hat{n}_t$, must satsify $\hat{n}_t < n^f$. If indeed $\hat{n}_t < n^f$, then the equilibrium level of trafficking is $n_t^* = \hat{n}_t$, and the equilibrium level of prostitution is $n^* = n^f$, as in the free equilibrium outcome but now comprising both voluntary prostitution and trafficking. If $\hat{n}_t \geq n^f$, however, we must solve the case below.

Trafficking-only. (Ib)-(Ic) yield unique prices of sex and marriage as a function of n:

$$p_s = \frac{y\sigma}{n\sigma + (1-n)} \tag{2}$$

and

$$p_m = \frac{y}{n\sigma + (1-n)}. \tag{3}$$

Substituting (Ie') and (2) into (Id) yields

$$\frac{y\sigma}{n\sigma + (1-n)} = c(n). \tag{4}$$

This yields a unique level of prostitution (all of which is trafficking in this case), $\tilde{n}_t$, which in turn pins down the prices of sex and marriage. Here, trafficking crowds out voluntary prostitution entirely, raises the total level of prostitution, and lowers the price of sex. It also lowers the price of marriage because, as sex becomes cheaper, marriage becomes less attractive to men; that is, traffickers not only harm their victims but they also have a negative externality on married women.

To see that the solution

$$n_t^* = \begin{cases} \tilde{n}_t & \text{for } \hat{n}_t > n^f \\ \hat{n}_t & \text{for } \hat{n}_t \leq n^f \end{cases} \qquad \text{and} \qquad n^* = \begin{cases} \tilde{n}_t & \text{for } \hat{n}_t > n^f \\ n^f & \text{for } \hat{n}_t \leq n^f \end{cases}$$

is continuous (across the two cases), note that the equality $\tilde{n}_t = \hat{n}_t$, by (1) and (4), implies the necessary condition $\frac{y\sigma}{n_t\sigma + (1-n_t)} = \frac{w}{1-{}^{1}\!/_{\sigma}}$, which can be written as $n_t = n^f$. That is, $\tilde{n}_t$ and $\hat{n}_t$ intersect exactly once, and do so at exactly $\tilde{n}_t = \hat{n}_t = n^f$.

Proposition 2. *Trafficking decreases voluntary prostitution, (weakly) increases total prostitution, and (weakly) decreases the prices of sex and marriage.*

As an example, consider the linear marginal cost function $c(n_t) = cn_t$, where $c > y$ gauges the scale diseconomies. The solutions to (1) and (4) can then be expressed as functions $\hat{n}_t(c)$

and $\tilde{n}_t(c)$.[15] Because of the two cases, there exists a unique $\overline{c}$ such that

$$n_t^*(c) = \begin{cases} \tilde{n}_t(c) & \text{for } c \leq \overline{c} \\ \hat{n}_t(c) & \text{for } c > \overline{c} \end{cases} \qquad \text{and} \qquad n^*(c) = \begin{cases} \tilde{n}_t(c) & \text{for } c \leq \overline{c} \\ n^f & \text{for } c > \overline{c} \end{cases}.$$

For $c > \overline{c}$, trafficking and voluntary prostitution co-exist; the price of sex is determined by the women's indifference condition, that is, the "marginal" entrant is a voluntary prostitute. As a result, total prostitution is constant at n^f, as in the free equilibrium but now including involuntary prostitution. As c decreases (thus making trafficking more profitable), the share of trafficked prostitutes increases until, at $c = \overline{c}$, voluntary prostitution is completely crowded out. For $c < \overline{c}$, all prostitution is then involuntary, and the trafficking technology determines total supply and the price of sex: prostitution increases and becomes cheaper when c falls. Figure 3 illustrates this example.

Turning back to the general model, we now consider the role of wages. In the case of co-existence, the level of trafficking $\hat{n}_t$ increases with the female wage w (see (1)). Intuitively, when women face better job alternatives, fewer choose prostitution voluntarily. This raises the price of sex, which – since traffickers do not internalize their victims' opportunity costs – makes trafficking more attractive. By contrast, in the trafficking-only case, the level of trafficking $\tilde{n}_t$ is independent of the female wage w but increases with the male wage y (see (4)). A rise in male income means that unmarried and married men can spend more on sex, which increases the overall demand for prostitution and thus for trafficking. Figures 2 (right graph) and 4 illustrate the impact of an increase in w.

Corollary 2. *Trafficking increases with female and male wages.*

Thus, the model predicts that the demand for trafficked prostitutes is larger where male wages are higher ($\Rightarrow$ higher demand for sex) and gender income inequality is lower ($\Rightarrow$ lower supply of voluntary prostitutes).[16]

So far, we have analyzed trafficking in the absence of legal restrictions on prostitution, which in policy debates is labeled *decriminalized* prostitution. According to Proposition 2, policies that reduce trafficking would not only protect potential victims but also strengthen

[15] More precisely, the solutions are

$$\hat{n}_t(c) = \frac{w}{c(1 - {}^1\!/\!_\sigma)} \quad \text{and} \quad \tilde{n}_t(c) = -\frac{1}{2(\sigma - 1)} + \sqrt{\frac{1}{4(\sigma - 1)^2} + \frac{y\sigma}{c(\sigma - 1)}}.$$

[16] This is consistent with the fact that North America and Western Europe are the main destination regions for transnational trafficking flows while South and East Asia as well as Central and Eastern Europe are the main origin regions (UNODC, 2012). While the analysis here focuses on domestic trafficking, Section 4.1 introduces cross-border trafficking into the model and shows that above insight still holds: Trafficking in(to) a country increases in male and female domestic wages.

women's position in marriage. Laws against prostitution may afford such benefits. But the above analysis warrants caution in this respect; as the role of female wages in Corollary 2 illustrates, factors that decrease only voluntary prostitution *increase* trafficking. This caveat is, as we will see, relevant also to prostitution laws.

3 Laws against prostitution

We examine in turn criminalizing the *sale* of sex and criminalizing the *purchase* of sex. This allows us to isolate the effects of each measure. We will refer to the criminalization of prostitutes as the "traditional" model because, prior to the passage of the Swedish model in 1999, johns were rarely prosecuted even in countries where the law on the books criminalized both sides of the market.[17]

3.1 Criminalizing prostitutes (traditional model)

Suppose the government orders the police to arrest prostitutes. Let policing be imperfect, so that a prostitute faces a probability $q < 1$ of being arrested. We abstract from the public resources spent on law enforcement and consider only the impact on trafficking and voluntary prostitution. When a prostitute is arrested, her income is confiscated and she bears a criminal penalty κ_s. Traffickers remain undetected and thus go unpunished but they lose the income of prostitutes that are arrested.[18]

When weighing prostitution against marriage, women take a potential arrest into account. Similarly, traffickers expect some loss of prostitutes, and hence income, due to arrests. This requires a modified indifference condition for women, (IIa), and a modified free-entry condition for traffickers, (IId), so that the equilibrium is now determined by

	Co-existence case	Trafficking-only case	
(IIa)	$\boldsymbol{(1-q)}p_s - \boldsymbol{q\kappa_s} = p_m + w$	$\boldsymbol{(1-q)}p_s - \boldsymbol{q\kappa_s} \leq p_m + w$	(IIa')
(Ib)	$p_s = \sigma p_m$		
(Ic)	$np_s = (1-n)(y - p_m) + ny$		
(IId)	$\boldsymbol{(1-q)}p_s = c(n_t)$		
(Ie)	$n_t < n$	$n_t = n$	(Ie')

[17] The 1959 United Nations Study on Traffic in Persons and Prostitution noted at the time that "whenever the law inflicts penalties on the client as well as on the prostitute, experience shows that, in practice, the repressive measures are enforced on the prostitute alone" (p.11).

[18] If trafficking is illegal, the risk of conviction for the trafficker constitutes part of the cost of trafficking, $c(n_t)$. Empirically, this risk is negligible; not only is the risk of arrest small but victims are often too afraid to testify against their perpetrators. For example, despite the fact that trafficking is illegal in the United States, only 130 traffickers were convicted from 2001 to 2005; estimates suggest that this represents a mere 3% of all traffickers (Kara, 2009).

II. Criminalizing prostitutes (traditional model)

The parts in **bold** are the changes relative to the setting with unregulated prostitution. Note that the men's indifference condition (I*b*) and the budget constraint (I*c*) are unaffected given that the purchase of sex is not prosecuted.

Contrary to before, we first consider the case with only trafficking, and then turn to the case in which also voluntary prostitution exists.

Trafficking-only. As before, combining (I*b*) and (I*c*) yields the price equations (2) and (3). This accounts for the men's valuation of commercial sex relative to marriage and their budget, i.e., for the demand. By plugging (2) and (Ie') into the traffickers' entry condition (II*d*), we equilibrate this demand with supply. Comparing the resulting equation,

$$(1-q)\frac{y\sigma}{n_t\sigma + (1-n_t)} = c(n_t), \tag{5}$$

with its analogue under unregulated prostitution, (4), reveals that the level of trafficking is lower here. The reason is that traffickers lose their "income" with probability q, which makes trafficking less lucrative. From the price equations (2) and (3), it follows that the decrease in trafficking raises the price of sex and hence also the price of marriage. That said, note that trafficking is never fully eliminated unless enforcement is perfect ((5) has a positive solution unless $q = 1$).

Co-existence. Once again, (I*b*) and (I*c*) yield the price equations (2) and (3). But in this case, because the marginal entrant is a voluntary prostitute, we match demand to supply by plugging (2) into the women's indifference condition (I*a*), as opposed to the traffickers' entry condition. This yields explicit solutions for the price of sex, the price of marriage, and the total level of prostitution:

$$p_s^* = \frac{w + q\kappa_s}{1 - q - 1/\sigma} \tag{6}$$

$$p_m^* = \frac{w + q\kappa_s}{(1-q)\,\sigma - 1} \tag{7}$$

$$n^* = \frac{(1 - q - 1/\sigma)\,y}{w + q\kappa_s} \tag{8}$$

As in the trafficking-only case, the criminalization of prostitutes (higher q or κ_s) increases both prices and decreases *total* prostitution. To determine the level of trafficking, we substitute (6) into (II*d*). Comparing the resulting equation,

$$\frac{w + q\kappa_s}{1 - \frac{1}{\sigma(1-q)}} = c(n_t). \tag{9}$$

with its analogue under unregulated prostitution, (1), reveals that the criminalization of prostitutes *increases* trafficking in this case. This in turn implies that voluntary prostitution decreases since total prostitution falls. In fact, a sufficiently large penalty κ_s renders the solution to (9) larger than n^* such that voluntary prostitution disappears completely.

Proposition 3. (Traditional model) *Criminalizing prostitutes*

(a) *Decreases total prostitution and increases the prices of sex and marriage,*

(b) *Increases trafficking so long as voluntary prostitution exists, but decreases it otherwise,*

(c) *Can eradicate voluntary prostitution, but cannot eradicate trafficking unless enforcement is perfect.*

The main insight is that, while criminalizing the sale of sex deters overall prostitution, its impact on trafficking is ambiguous. More precisely, whether trafficking increases or decreases hinges on whether or not there is voluntary prostitution (see Figure 5). To understand why this is the case, consider the impact of the two "law enforcement parameters" κ_s (the criminal penalty) and q (the probability of arrest).

Figure 5

Note that κ_s appears in the women's indifference condition ((IIa)) but not the traffickers' zero-profit condition ((IId)); κ_s is inflicted on prostitutes and not internalized by traffickers. Consequently, κ_s deters voluntary entry but not trafficking. Hence, as shown in Figure 5 (bottom left), κ_s is irrelevant when the marginal prostitute is trafficked (as in the trafficking-only case) but decreases overall prostitution when the marginal prostitute is a voluntary one (as in the co-existence case). To see why trafficking *increases* in the co-existence case, note that (raising) κ_s causes voluntary exit from the market until the price of sex rises to a level that compensates any remaining voluntary prostitutes for the incidence of $q\kappa_s$. But such a price increase always overcompensates traffickers who do not bear this cost; thus, trafficking becomes more lucrative.

This discussion of κ_s has a clear-cut implication.

Corollary 3. *Increasing the criminal penalty for prostitutes can only increase trafficking.*

Unlike κ_s, q affects both voluntary prostitutes ((IIa)) and traffickers ((IId)), since both internalize income losses from arrests (of prostitutes). Hence, as shown in Figure 5 (bottom right), an increase in q decreases prostitution also in the trafficking-only case; which means that it decreases trafficking once voluntary prostitution is absent. In the co-existence case, however, q has the same qualitative effect as κ_s. Of course, for $\kappa_s > 0$, higher q imply higher

expected criminal penalties, which are borne only by prostitutes, not by traffickers. Yet, as evident in (9), trafficking increases with q in the co-existence case even for $\kappa_s = 0$. To see why, note that higher q raise both the price of sex and the price of marriage (see (6) and (7)). Intuitively, criminalizing the sale of sex acts like a "tax" on commercial sex, and this makes the aggregate (married and commercial) supply of sex more expensive. This in turn makes it more attractive to extort income from women, whether wives or prostitutes; as the surplus from marriage cannot be extorted (by assumption), it is trafficking that increases. In other words, traffickers do not internalize the marriage benefits they deprive their victims of, whereas voluntary prostitutes take these opportunity costs into account.[19] Thus, raising q disincentivizes voluntary prostitutes more than traffickers even if $\kappa_s = 0$.

3.2 Criminalizing johns (Swedish model)

Suppose the government orders the police to arrest johns but spare the prostitutes. Arrests occur after the sex transaction and a john's probability of being arrested is $q < 1$. An arrested john who has bought x units of sex receives the penalty $x\kappa_b$. This assumption captures the idea that men who buy more sex are caught and penalized more frequently. We allow prostitutes to keep their income to isolate the demand-side effects of criminalizing the buyers.

Men now take a potential arrest into account when entering the market for sex. In effect, they value one unit of sex at $\hat{e} \equiv e - q\kappa_b$ and, relative to marriage, at $\hat{\sigma} \equiv \hat{e}/k$. If $\hat{\sigma} \leq 1$, there is no demand for prostitution (cf. Assumption 1). Otherwise, men's demand must satisfy the same indifference condition as under unregulated prostitution except that $\hat{\sigma}$ replaces σ ((IIIb)). With the women's indifference condition, the budget constraint, and the traffickers' zero-profit condition unaffected by the law, the equilibrium is thus determined by

Co-existence case	**Trafficking-only case**
(Ia) $p_s = p_m + w$	$p_s \leq p_m + w$ (IIa')
(IIIb) $p_s = \boldsymbol{\hat{\sigma}} p_m$	
(Ic) $np_s = (1-n)(y - p_m) + ny$	
(Id) $p_s = c(n_t)$	
(Ie) $n_t < n$	$n_t = n$ (Ie')

[19] To show that this intuition is correct, let us modify the traffickers' zero-profit condition (9), which pins down the level of trafficking in the co-existence case, as follows. First, we set $\kappa_s = 0$ to eliminate the first effect. Second, we add the price of marriage (7) to the traffickers' marginal cost (i.e., to the right-hand side), thus "forcing" the traffickers to internalize the opportunity cost of their victims. The modified condition

$$\frac{w}{1 - \frac{1}{\sigma(1-q)}} = c(n_t) + \frac{w}{(1-q)\,\sigma - 1}$$

simplifies to $w = c(n_t)$. That is, it is independent of q.

III. Crimnalizing johns (Swedish model)

Trafficking-only. Following the same steps as previously, we get

$$p_s = \frac{\hat{\sigma} y}{\hat{\sigma} n_t + (1 - n_t)} \tag{10}$$

$$p_m = \frac{y}{\hat{\sigma} n_t + (1 - n_t)} \tag{11}$$

$$c(n_t) = \frac{\hat{\sigma} y}{\hat{\sigma} n_t + (1 - n_t)} \tag{12}$$

For any $\hat{\sigma}$, (12) yields a unique solution $\tilde{n}_t(\hat{\sigma})$ and, by the Implicit Function Theorem, $\tilde{n}_t'(\hat{\sigma}) > 0$. Hence, stricter criminalization (lower $\hat{\sigma}$) reduces trafficking in this case. The intuition is simply that criminalization reduces the demand for prostitution. The price of sex may increase or decrease,

$$\frac{\partial}{\partial \hat{\sigma}} \left(\frac{1}{p_s^*} \right) = \tfrac{1}{y} \tfrac{\partial}{\partial \hat{\sigma}} \left[\tilde{n}_t(\hat{\sigma}) + \tfrac{1 - \tilde{n}_t(\hat{\sigma})}{\hat{\sigma}} \right] = \frac{1}{y} \underbrace{\frac{\partial \tilde{n}_t(\hat{\sigma})}{\partial \hat{\sigma}} \left(1 - \frac{1}{\hat{\sigma}} \right)}_{>0} + \frac{1}{y} \underbrace{\frac{1}{\hat{\sigma}^2} \left[\tilde{n}_t(\hat{\sigma}) - 1 \right]}_{<0},$$

due to two countervailing effects of criminalizing johns: The reduction in men's valuation of commercial sex (relative to marriage), on one hand, pushes the price down. The decrease in the supply of prostitutes, on the other hand, pushes the price up. By contrast, both of these consequences – higher relative valuation of marriage and lower supply of prostitutes – increase the price of marriage:

$$\frac{\partial}{\partial \hat{\sigma}} \left(\frac{1}{p_m^*} \right) = \frac{1}{y} \frac{\partial}{\partial \hat{\sigma}} \left(\hat{\sigma} \tilde{n}_t(\hat{\sigma}) + 1 - \tilde{n}_t(\hat{\sigma}) \right) = \frac{1}{y} \underbrace{\left[\tilde{n}_t(\hat{\sigma}) + (\hat{\sigma} - 1) \frac{\partial \tilde{n}_t(\hat{\sigma})}{\partial \hat{\sigma}} \right]}_{>0}.$$

Co-existence. In this case, we obtain

$$p_s^* = \frac{w}{1 - 1/\hat{\sigma}} \tag{13}$$

$$p_m^* = \frac{w}{\hat{\sigma} - 1} \tag{14}$$

$$n^* = \rho - \frac{1}{\hat{\sigma} - 1} \tag{15}$$

It is straightforward to see that the criminalization (lower $\hat{\sigma}$) not only decreases total prostitution but increases both prices. This implies that trafficking increases in this case, as we

see by substituting (13) into (Id):

$$\frac{w}{1 - 1/\hat{\sigma}} = c(n_t). \tag{16}$$

As with the criminalization of prostitutes, this effect operates through the opportunity costs of prostitution: The criminalization of johns increases male preference for marriage. This raises the price of marriage, and hence the opportunity cost of entering into prostitution. So long as marginal entry into prostitution is voluntary, the price of sex therefore also increases. This in turn attracts more traffickers who, unlike voluntary prostitutes, do not internalize the opportunity costs of forgone marriage.

Proposition 4. (Swedish model) *Criminalizing johns*

(a) *Decreases total prostitution and increases the price of marriage,*

(b) *Increases trafficking when voluntary prostitution exists but decreases it otherwise,*

(c) *Can eradicate voluntary prostitution and trafficking.*

On the surface, a policy targeted at the demand for prostitution would appear to affect all supply, whether voluntary or involuntary, equally. Our analysis suggests that this is not the case. Nevertheless, criminalizing johns has several advantages over criminalizing prostitutes: First, while both approaches increase the difference in opportunity costs between traffickers and voluntary prostitutes, the latter creates a further wedge by imposing criminal penalties on prostitutes. Second, as much as it is difficult to justify criminal penalties for voluntary sex transactions, it is unequivocally wrong to punish trafficking victims. Third, while penalties on prostitutes (κ_s) never decrease trafficking (Corollary 3), penalties on johns (κ_b) can. In fact, criminalizing johns can eradicate trafficking, even when enforcement is imperfect, while criminalizing prostitutes cannot. The reason is that, unlike supply, all demand is voluntary. That said, even criminalizing johns fails to eradicate prostitution if, contrary to our current assumption, some demand is inelastic – for instance, if some men are excluded from the marriage market and their urge for sex is so strong that no reasonable penalty deters them from buying sex.

3.3 Are laws against prostitution effective against trafficking?

Our model predicts that criminalization is more likely to deter trafficking where prostitution is less likely to be voluntary, which depends on male and female wages and the traffickers' cost function. In the model, the point at which voluntary prostitution ceases to exist – and hence at which criminalization becomes effective against trafficking – is where the solution to the traffickers' entry condition equals the total number of prostitutes, i.e., where $p_s^* = c(n^*)$.

We know from above that, in the co-existence case, any type of criminalization (i.e., raising q, κ_s, or κ_b) increases p_s^* and decreases n^*. Thus, there exists a threshold value $\overline{q}$, $\overline{\kappa}_s$, or $\overline{\kappa}_b$ such that further criminalization is effective if and only if $q > \overline{q}$, $\kappa_s > \overline{\kappa}_s$, or $\kappa_b > \overline{\kappa}_b$, ceteris paribus. It is precisely at such a threshold value that the equation $p_s^* = c(n^*)$ holds.

Now consider the role of the female wage w. We know that $\partial p_s^*/\partial w > 0$ (see (6) and (13)) and $\partial n^*/\partial w < 0$ (see (8) and (15)). Applying the Implicit Function Theorem to the threshold equation $p_s^* = c(n^*)$ yields

$$\frac{\partial \overline{q}}{\partial w}, \frac{\partial \overline{\kappa}_s}{\partial w}, \frac{\partial \overline{\kappa}_b}{\partial w} = -\frac{\partial p_s^*/\partial w - c'(n^*)\partial n^*/\partial w}{\partial p_s^*/\partial q - c'(n^*)\partial n^*/\partial q}, -\frac{\partial p_s^*/\partial w - c'(n^*)\partial n^*/\partial w}{\partial p_s^*/\partial \kappa_s - c'(n^*)\partial n^*/\partial \kappa_s}, -\frac{\partial p_s^*/\partial w - c'(n^*)\partial n^*/\partial w}{\partial p_s^*/\partial \kappa_b - c'(n^*)\partial n^*/\partial \kappa_s} < 0.$$

This implies ceteris paribus that the threshold value $\overline{q}$, $\overline{\kappa}_s$, or $\overline{\kappa}_b$ is smaller when w is larger. Or putting it differently, criminalization has a deterrence effect on trafficking at *lower* levels of criminalization when female wages are *higher*. One can similarly verify that the comparative statics on the male wage have the opposite sign. In sum, this implies:

Corollary 4. *Laws against prostitution are more (less) likely to decrease (increase) trafficking when the male-female income ratio is low.*

Next consider the role of the traffickers' cost function. Intuitively, the lower the cost of trafficking, the less likely is voluntary prostitution, and hence the more likely is criminalization an effective tool to combat trafficking. To capture this idea, let us introduce a parameter l into the cost function, $c(n_t; l)$, and assume $\partial c/\partial l > 0$ for all n_t. In words, for any level of trafficking, increasing l makes it costlier for traffickers to operate. We interpret l as the level of *direct* law enforcement effort against traffickers.

Applying the Implicit Function Theorem to the modified threshold equation $p_s^* = c(n^*; l)$ yields

$$\frac{\partial \overline{q}}{\partial l}, \frac{\partial \overline{\kappa}_s}{\partial l}, \frac{\partial \overline{\kappa}_b}{\partial l} = -\frac{-\partial c/\partial l}{\partial p_s^*/\partial q - c'(n^*)\partial n^*/\partial q}, -\frac{-\partial c/\partial l}{\partial p_s^*/\partial \kappa_s - c'(n^*)\partial n^*/\partial \kappa_s}, -\frac{-\partial c/\partial l}{\partial p_s^*/\partial \kappa_b - c'(n^*)\partial n^*/\partial \kappa_s} > 0.$$

This means ceteris paribus that the threshold value $\overline{q}$, $\overline{\kappa}_s$, or $\overline{\kappa}_b$ increases with l. That is, criminalizing prostitutes or johns is more (less) likely to increase (decrease) trafficking when the level of direct law enforcement effort against traffickers is higher.

Corollary 5. *Laws against prostitution and law enforcement targeted directly at traffickers have countervailing effects as long as voluntary prostitution exists.*

A third aspect to consider is that laws against prostitution, irrespective of their impact on trafficking, come at the expense of voluntary prostitutes. Indeed, the model predicts that such laws do not reduce trafficking before they have eliminated all voluntary prostitution.

In view of this "collateral damage," laws against prostitution are controversial, even when effective, because they pit the prevention of trafficking against voluntary prostitution.

4 Occupational regulation

A number of countries, notably the Netherlands, have created legal but regulated prostitution markets. This approach differs from decriminalization (i.e., unregulated prostitution) in that it imposes constraints on prostitutes such as registration, licensing, or zoning. At the same time, it differs from criminalization in that it provides for a legal market where some form of prostitution is permitted. In this section, we first analyze the Dutch model and compare it to decriminalization, the traditional model, and the Swedish model. Afterwards, we propose a new regulatory approach.

4.1 Licensed prostitution (Dutch model)

Suppose the government allows prostitutes to sell sex provided they are licensed, but that any unlicensed sale of sex is illegal. We assume that the cost of getting a license is negligible for a voluntary prostitute and that a trafficking victim would not pass the licensing procedure. An unlicensed prostitute faces a probability $q < 1$ of being arrested. If arrested, she loses her income (but bears no criminal penalty). Traffickers remain undetected but lose income when their prostitutes are arrested.

There are now two markets for commercial sex, licensed and unlicensed, with respective prices $p_{s,l}$ and $p_{s,u}$. Let us first establish that voluntary prostitutes always work legally. Suppose a voluntary prostitute works on the unlicensed market, where her expected payoff is $(1-q)p_{s,l}$ due to the probability of arrest. Clearly, she would rather offer the same price on the licensed market, which gives her $p_{s,u}$ with certainty, assuming that men's valuation of sex is independent of the prostitute's legal status. Next, note that, barring perfect enforcement ($q = 1$), trafficking always exists when voluntary prostitution exists. So long as $p_{s,l} > 0$, traffickers charging the same price on the unlicensed market expect $(1-q)p_{s,l}$ in revenue from an involuntary prostitute. So, as before, we must consider the co-existence and trafficking-only cases.

Last, note that the men's indifference condition must hold with respect to either market for that market to exist. In the co-existence case, this implies $p_s = p_{s,l} = p_{s,u}$. In the trafficking-only case, only the unlicensed market exists, so $p_s = p_{s,u}$. After these simplifications, the equilibrium conditions are essentially the same as under unregulated prostitution, with the exception of the traffickers' zero-profit condition ((IVd)), which is the same as under the traditional model:

	Co-existence case	Trafficking-only case	
(Ia)	$p_s = p_m + w$	$p_s \leq p_m + w$	(Ia')
(Ib)	$p_s = \sigma p_m$		
(Ic)	$(1-n)(y-p_m) + ny = np_s$		
(IVd)	$\boldsymbol{(1-q)p_s} = c(n_t)$		
(Ie)	$n_t < n$	$n_t = n$	(Ie')

IV. Licensed prostitution (Dutch model)

Trafficking-only. Since all prostitutes are trafficked, an increase in q has the same effect as under the traditional model: It increases the prices of sex and marriage, and decreases trafficking and total prostitution.

Co-existence. Both prices and the total level of prostitution are fully determined by (Ia)-(Ic), which yield the same values as under unregulated prostitution and as in the absence of trafficking: p_s^f, p_m^f, and n^f. These values are unaffected by q. Plugging p_s^f into (IId),

$$(1-q)p_s^f = c(n_t), \tag{17}$$

pins down the level of trafficking, $\hat{n}_t$, which is clearly decreasing in q. This also implies that the level of voluntary prostitution, $n^f - \hat{n}_t$, is increasing in q. In fact, raising q increases voluntary prostitution towards its free equilibrium level. Still, some involuntary prostitution always remains unless enforcement is perfect ($q = 1$).

Proposition 5. (Dutch model) *Licensing prostitutes and criminalizing unlicensed prostitutes*

- *Unambiguously decreases trafficking,*
- *Increases voluntary prostitution if such would exist in the absence of trafficking,*
- *But cannot eradicate trafficking unless enforcement is perfect.*

Here, voluntary prostitution is not crowded out: It exists for all $q \geq 0$ if it exists under unregulated prostitution ($q = 0$). Even if it does not exist for some q, voluntary prostitution emerges in the limit ($q \to 1$) provided that it would exist in the free equilibrium ($n^f > 0$).

In the trafficking-only case, the Dutch model is equivalent to the traditional model of criminalizing all prostitutes, since all prostitution is unlicensed in this case. In the absence of voluntary prostitution, both models thus induce the same level of trafficking. The zero-profit condition for traffickers ((IVd)) is the same under both models also in the co-existence case,

but the equilibrium price of sex is different. We can thus compare the co-existence levels of trafficking by simply looking at p_s^*. For $q = 0$, both models are equivalent to unregulated prostitution. As q increases, the price of sex p_s^* increases under the traditional model but is independent of q under the Dutch model. This implies the following:

Corollary 6. *Given the same probability of arrest $q \in (0, 1)$ for illegal prostitutes, licensing prostitution leads to weakly less trafficking than criminalizing prostitutes, and to strictly less if the level of licensed prostitution is non-zero. Licensing prostitution always leads to strictly less trafficking than decriminalization.*

Comparing the Dutch and Swedish models is less straightforward. Since the two models target different sides of the market, assuming equal arrest probabilities for the comparison is less natural. An unambiguous point, however, is that a sufficiently severe criminal penalty for johns makes the Swedish model more effective against trafficking than the Dutch model can ever be:

Corollary 7. *Given arrest probabilities below 1, there always exists a criminal penalty $\kappa_b > 0$ for johns such that criminalizing johns leads to strictly less trafficking than licensing prostitution for any κ_s. Unlike licensed prostitution, it can even eradicate trafficking.*

This is because sufficiently severe criminal penalties against johns can deter *all* demand, whereas criminal penalties against prostitutes, licensed or not, fail to deter trafficked supply. Thus, enforcing compliance to the licensing requirement by penalizing unlicensed suppliers – which is how occupational licensing is enforced – is appropriate when supply is voluntary, but ineffective when such suppliers are coerced.[20]

While the Swedish model is more effective against trafficking, this effectiveness comes at the expense of voluntary prostitutes: The Swedish model eradicates voluntary prostitution before it eradicates trafficking. The Dutch model is less effective against trafficking but it does not restrict voluntary prostitution; on the contrary, it *increases* voluntary prostitution. The choice between the Dutch and Swedish models is thus a question of regulatory priorities.

4.2 New proposal ("Dutch-Swedish" model)

So far, we have considered regulatory models that exist in practice. In this section, we propose a new but related model: licensing prostitutes and criminalizing the customers of unlicensed prostitutes. Suppose the government issues licenses to voluntary prostitutes and

[20] Illegal brothels have been shown to operate parallel to legal ones in the Netherlands (Simons, 2008) and Turkey (Smith, 2005). In Nevada, even though prostitution outside of licensed brothels is illegal, escort services offering sexual services occupy about 140 pages of the Las Vegas Yellow Pages. In 2009 the Federal Bureau of Investigation identified Las Vegas – a city without legal brothels – as one of the 14 U.S. cities with the highest rates of child prostitution (Whaley, 2010).

orders the police to arrest johns that purchase sex from unlicensed prostitutes. An arrested john who has bought x units of sex from unlicensed prostitutes receives the penalty $x\kappa_b$. His (relative) valuation of a unit of *unlicensed* sex is therefore $\hat{e} \equiv e - q\kappa_b$ ($\hat{\sigma} = \hat{e}/k$). Unlicensed prostitutes are not prosecuted and can keep their income.

Under this model, unlicensed prostitutes quote lower prices than licensed ones. A john's expected utility from buying x units of sex in the unlicensed market is $x(e - p_{s,u} - q\kappa_b)$, whereas his expected utility from buying the same amount of sex in the licensed market is $x(e - p_{s,l})$. Both markets exist if and only if $p_{s,u} + q\kappa_b = p_{s,l}$, which implies $p_{s,u} < p_{s,l}$. This has two important consequences: First, voluntary prostitutes prefer the licensed market. Second, it is possible that $p_{s,u} \leq 0 < p_{s,l}$ and hence that, unlike under the other models, only the licensed market exists. Considering three cases now, we examine each in turn.

Trafficking-only. The equilibrium conditions for this case are

$$\begin{aligned}
\boldsymbol{p_{s,u} + q\kappa_b} &\leq p_m + w && (Va)\\
\boldsymbol{p_{s,u}} &= \boldsymbol{\hat{\sigma}} p_m && (\mathrm{V}b)\\
(1-n)(y - p_m) + ny &= n\boldsymbol{p_{s,u}} && (\mathrm{V}c)\\
\boldsymbol{p_{s,u}} &= c(n_t) && (\mathrm{V}d)\\
n_t &= n && (V\mathrm{e})
\end{aligned}$$

Since all prostitutes are trafficked, increasing q or κ_b has the same effect as under the Swedish model. Indeed, when substituting $p_{s,u} = p_s$, the last four equations collapse to their analogues under the Swedish model. However, unlike there, increasing q or κ_b tends to restore voluntary prostitution under this model. Substituting (Vb) into (Va), we can rearrange (Va) to

$$q\kappa_b \leq w + (1 - \hat{\sigma})p_m. \tag{18}$$

Solving (Vb) and (Vb) for $p_{s,u}$, one can verify that $p_{s,u} > 0 \Leftrightarrow \hat{\sigma} > 1$, which is to say $\hat{\sigma} > 1$ is a necessary condition for trafficking to exist. It then follows that there are $q\kappa_b$ large enough for either $\hat{\sigma} > 1$ or (18) to be violated, in which case the inexistence of voluntary prostitution cannot be an equilibrium outcome.

Co-existence. The equilibrium conditions for this case are

$$\begin{aligned}
\boldsymbol{p_{s,l}} &= p_m + w && (\mathrm{V}a')\\
\boldsymbol{p_{s,l}/\sigma, p_{s,u}/\hat{\sigma}} &= \boldsymbol{p_m} && (\mathrm{V}b')\\
(1-n)(y - p_m) + ny &= \boldsymbol{n_t p_{s,u} + (n - n_t) p_{s,l}} && (\mathrm{V}c')\\
\boldsymbol{p_{s,u}} &= c(n_t) && (\mathrm{V}d)\\
n_t &< n && (\mathrm{V}e')
\end{aligned}$$

(Va') and the male indifference between marriage and licensed sex in (Vb') pin down the price of licensed sex and the price of marriage as $p_{s,l} = \frac{w}{1-1/\sigma} = p_s^f$ and $p_m = \frac{w}{\sigma-1} = p_m^f$. These are the same values as under unregulated prostitution and independent of q and κ_b. Next, $p_m = \frac{w}{\sigma-1}$ and the male indifference between marriage and unlicensed sex in (Vb') pin down the price of unlicensed sex as $p_{s,u} = \frac{\hat{\sigma}w}{\sigma-1}$. Plugging $p_{s,u}$ into the traffickers' zero-profit condition (Vd') yields

$$\frac{\hat{\sigma}w}{\sigma-1} = c(n_t). \tag{19}$$

The solution to this equation, $\hat{n}_t$, is unique and strictly increases with $\hat{\sigma}$, which means that trafficking strictly decreases with the arrest probability q and the criminal penalty κ_b. Indeed, for $q\kappa_b \geq e$ ($\hat{\sigma} \leq 0$), trafficking vanishes and the voluntary-only case obtains, which we analyze below. Finally, plugging all prices and $\hat{n}_t$ into the budget constraint (IVc) yields the total level of prostitution

$$n^* = \rho - \frac{1}{\sigma-1} + \frac{\sigma-\hat{\sigma}}{\sigma-1}\hat{n}_t. \tag{20}$$

This is non-negative since $\sigma > 1$, $\rho \geq \frac{1}{\sigma-1}$ (Assumption 1), $\sigma > \hat{\sigma}$, and $\hat{n}_t \geq 0$. The same inequalities also imply $n^* > \hat{n}_t$; that is, the number of voluntary prostitutes is strictly positive.

How n^* varies with $\hat{\sigma}$ depends on the last term in (20), differentiating which with respect to $\hat{\sigma}$ yields

$$\frac{\partial}{\partial\hat{\sigma}}\left(\frac{\sigma-\hat{\sigma}}{\sigma-1}\hat{n}_t\right) = \frac{1}{\sigma-1}\left[\frac{\sigma-\hat{\sigma}}{\sigma-1}\frac{w}{c'} - \hat{n}_t\right] \tag{21}$$

where $\frac{\partial\hat{n}_t}{\partial\hat{\sigma}} = \frac{w}{c'(\sigma-1)}$ comes from applying the Implicit Function Theorem to (19). The sign of (21) is ambiguous because a decrease in trafficking induces an increase in voluntary prostitution: When the number of unlicensed prostitutes *and* the price of unlicensed sex fall, men spend more of their income on both voluntary prostitution and marriage. From the analysis of the free equilibrium (Section 2.1), we know that voluntary prostitution increases with total income spent in these two markets.[21]

The countervailing impacts on trafficking and voluntary prostitution can cause a non-monotonic net effect on total prostitution. On one hand, as the price of unlicensed sex falls due to criminalization, the amount of income shifted away from the unlicensed market increases *concavely* with the absolute decrease in unlicensed prostitution. On the other

[21] Suppose, to the contrary, that trafficking decreases by $a > 0$ and voluntary prostitution by $b > 0$ as the result of an increase in $q\kappa_b$. Total prostitution, n, then decreases by $a + b > 0$. Since $p_m = p_m^f$ is unaffected by the change, a decrease in n implies that the left-hand side of the budget constraint (IVc) *increases*. At the same time, the right-hand side of (IVc) can be written as $(n_t - a)\,p_{s,t} + (n - n_t - b)\,p_{s,v}$, which, given that the change reduces $p_{s,t}$ but leaves $p_{s,v} = p_s^f$ unaffected, *decreases* for $a > 0$ and $b > 0$. Thus, this cannot be an equilibrium response. Since we know that $a > 0$, it must be that $b < 0$.

hand, voluntary prostitution increases *linearly* with total income diverted to licensed sex and marriage (cf. $n^f = \frac{y}{w} - \frac{1}{\sigma-1}$ in the free equilibrium). As a result, increasing q or κ_b may initially raise total prostitution n^*, but eventually decreases it. In the limit, as $\hat{n}_t \to 0$, total prostitution n^* always converges to the free equilibrium level n^f (see (20)).[22]

Voluntary-only. The equilibrium conditions for this case are

$$\begin{aligned} \boldsymbol{p_{s,l}} &= p_m + w && (\text{V}a') \\ \boldsymbol{p_{s,l}} &= \sigma p_m && (\text{V}b'') \\ (1-n)(y-p_m) + ny &= n\boldsymbol{p_{s,l}} && (\text{V}c'') \\ \boldsymbol{p_{s,l} - q\kappa_b} &\leq \boldsymbol{0} && (\text{V}d'') \end{aligned}$$

Since all prostitutes are voluntary, there is only one relevant price of sex. Substituting $p_s = p_{s,l}$, these conditions collapse into (Ia)-(Ic), which determine the free equilibrium outcome p_m^f, p_s^f, and n^f.

Proposition 6. (New proposal) *Licensing prostitutes and criminalizing johns that purchase sex from unlicensed prostitutes*

- *Unambiguously decreases trafficking,*
- *Increases voluntary prostitution if such would exist in the absence of trafficking,*
- *Can eradicate trafficking.*

The voluntary-only case allows for an unambiguous comparison to the other models:

Corollary 8. *For $\kappa_b > {}^{(e-k)}/_q$, licensing prostitutes and criminalizing johns that purchase sex from unlicensed prostitutes strictly dominates all other models, as it restores the free equilibrium outcome.*

The logic behind this proposal is simple: Criminalizing purchases from unlicensed prostitutes creates a price differential that induces voluntary prostitutes to self-select into the licensed market. This leaves only trafficked prostitutes in the unlicensed market. Making

[22] Consider, for example, the linear cost function $c(n_t) = cn_t$. Here, the level of trafficking is $\hat{n}_t = \frac{p_{s,t}}{c} = \frac{\hat{\sigma} w}{c(\sigma-1)} = \frac{w(e-q\kappa_b)}{kc(\sigma-1)}$ and decreases linearly with the policy, $\partial \hat{n}_t / \partial(q\kappa_b) = -\frac{w}{kc(\sigma-1)}$. Total male income spent on marriage and voluntary prostitution is $\hat{y} \equiv y - \hat{n}_t p_{s,t} = y - \frac{1}{c} p_{s,t}^2 = y - \frac{1}{c}[w(e-q\kappa_b)(\sigma-1)^{-1}k^{-1}]^2$, which is increasing and concave in the policy, $\partial \hat{y} / \partial(q\kappa_b) = \frac{2}{c}\frac{w^2}{k^2(\sigma-1)^2}(e-q\kappa_b)$ and $\partial^2 \hat{y} / \partial(q\kappa_b)^2 = -\frac{2}{c}\frac{w^2}{k^2(\sigma-1)^2}$. Total prostitution is given by $n^* = \rho - \frac{1}{\sigma-1} + \frac{w}{ck^2(\sigma-1)^2} q\kappa_b(e-q\kappa_b)$ and varies with the policy according to

$$\frac{\partial n^*}{\partial(q\kappa_b)} = \frac{w}{ck^2\,(\sigma-1)^2}(e-2q\kappa_b),$$

which is positive for $q\kappa_b \in [0, {}^e/_2]$ but negative for $q\kappa_b \in ({}^e/_2, e]$; for $q\kappa_b \geq e$, trafficking vanishes and total prostitution is constant at n^f.

the criminal penalties on johns in the unlicensed market sufficiently sufficiently severe then shifts all demand from trafficked prostitutes in the unlicensed market to voluntary ones in the licensed market, thereby destroying the traffickers' business.

This model dominates the Dutch one because it circumvents the issue of coercion on the supply side: It attacks the *demand* for unlicensed sex, which – unlike unlicensed supply – is entirely voluntary. This model also dominates the Swedish one because it restores voluntary prostitution to its free equilibrium level by creating the licensed market. This is also why it, unlike the Swedish model, can eradicate trafficking even when some demand is inelastic. While the Swedish model must suppress all demand to eradicate trafficking, this model must only divert the demand to the licensed market. The implementation of this model requires seller licensing and buyer criminalization, which are the characteristic elements of the Dutch and Swedish models. Our proposal should therefore face the same implementation challenges as these existing models.

5 Extensions

Some of our results on criminalization may not hold for small open countries where cross-border supply and demand effects can change the impact of policies. In addition, when behavior is affected by social norms and law plays an expressive role, legalization of prostitution may make commercial sex more acceptable in the population and thus increase it. We analyze these possibilities below. We also analyze which constituents in our model would like to enact prostitution laws.

5.1 *Migrant prostitutes and cross-border trafficking*

Some of the effects in the previous analysis depend on the link between the marriage market and the sex market created by women's choice between marriage and prostitution. This suggests that the supply of prostitutes, whether voluntary or involuntary, from abroad can change the impact of policies because it potentially weakens the link between the domestic sex market and the domestic marriage market.

Suppose the country described in the previous sections opens its borders, and women from the rest of the world can immigrate to work as prostitutes at cost $c_f = r + p_{m,f}$, which includes relocation expenses, r, and the foregone opportunity of marriage in the origin country, $p_{m,f}$. While such costs can be heterogenous, c_f represents the minimum and the country is so small that, for all intents and purposes, the supply of foreign prostitutes is infinitely elastic at this cost. For simplicity, immigrants do not enter the domestic marriage market.[23]

[23] Assuming that immigrant women are less valuable in the marriage market or face lower domestic wages

Assumption 3. $c_f < p_s^* = \frac{w}{1-1/\sigma}$.

This assumption says that the "production" cost of foreign voluntary prostitutes does not exceed the price of sex in a market with only domestic voluntary prostitutes, that is, foreign prostitutes can compete with domestic ones. Note that Assumption 2 is more likely to hold for high w, in which case fewer domestic women voluntarily enter prostitution. This implies that countries with higher female wages have fewer domestic prostitutes and experience a larger inflow of prostitutes from countries where women earn less.

Foreign prostitutes enter the market so long as $p_s > c_f$. So, in equilibrium, the price of sex satisfies

$$p_s = c_f. \tag{22}$$

Given that the supply of commercial sex is infinitely elastic at this price, men will spend the minimum on marriage to maximize the consumption of sex. The minimum price of marriage that domestic women demand is given by $p_m = p_s - w$, so

$$p_m = \max\{c_f - w, 0\}. \tag{23}$$

The prices (22) and (23) also determine the men's choice between getting married and buying more sex. Men have a strictly positive demand for marriage if $\frac{p_m}{p_s}e < k$. When $p_m = 0$, this clearly holds. When $p_m = c_f - w > 0$, this inequality becomes

$$c_f < \frac{w}{1 - 1/\sigma}, \tag{24}$$

which, by Assumption 2, also holds. Thus, all domestic men and women get married in equilibrium; the inflow of cheaper foreign prostitutes entirely crowds out domestic prostitution. The equilibrium level of (foreign) prostitution, n_f, is hence given by the budget constraint $y - p_m = p_s n_f$, which after substituting (22) and (23) yields

$$n_f = \min\left\{\frac{y+w}{c_f} - 1, \frac{y}{c_f}\right\}. \tag{25}$$

The inflow of foreign prostitutes rises with both male and female wages. In either case more male income is spent on commercial sex, in the second case because the price of marriage decreases when domestic women earn more. Altogether, this implies that countries with higher wages attract more foreign prostitutes, or as discussed below, more cross-border trafficking.

It is easy to introduce cross-border trafficking into this setting. Again, suppose the country is so small that, as with voluntary migrant prostitutes, the supply of trafficking is

yields similar conclusions.

infinitely elastic at a given cost. Since traffickers only care about the relocation costs r but not about the women's opportunity costs such as foregone marriage, the cost of trafficking is $c_{f,t} = r < c_f$. Trafficking thus crowds out voluntary foreign prostitutes; that is, $c_{f,t}$ replaces c_f in the above equations and all foreign prostitutes will be trafficked ones.

Criminalization unambiguously reduces trafficking in this case. This is because, if trafficking from abroad is cheap and infinitely elastic, the sex market is decoupled from marriage markets. So criminalization does not crowd out voluntary prostitution. Consider criminalizing prostitutes with $\kappa_s = 0$. The traffickers' zero-profit condition is then $(1-q)p_s = c_{f,t}$, or $p_s = \frac{c_{f,t}}{1-q}$. This affects the price of marriage, $p_m = p_s - w$, and the budget constraint, which becomes

$$y - \max\left\{\frac{c_{f,t}}{1-q} - w, 0\right\} = \frac{c_{f,t}}{1-q} n_f. \tag{26}$$

For a fixed n_f, higher q increase the right-hand side but decrease the left-hand side: Not only does criminalization make sex more expensive but it also lowers total spending on sex as the price of marriage rises. As a consequence, fewer prostitutes can be supported in equilibrium; that is, n_f must fall to satisfy the equation.

Nevertheless, the "Dutch-Swedish" model proposed in Section 4.2 is weakly better than across-the-board criminalization. It is as effective against foreign trafficking, but further permits voluntary foreign prostitution. In the absence of voluntary prostitutes, the "Dutch-Swedish" model is actually equivalent to the Swedish one.[24]

5.2 *Sex tourism*

The previous section focuses on cross-border supply effects by restricting men to domestic markets. This subsection does the opposite; it focuses on cross-border demand effects by restricting women to domestic markets. Consider two identical countries, A and B, each described by our basic model. The male wage, y, the female wage, w, the value of marriage, k, and the value of sex, e, are the same across the two countries. Women enter only domestic markets. Men marry only domestic women but, crucially, can buy sex domestically or abroad. Traffickers operate internationally and their cost function is $c(n_t)$.

We make a simple comparison. The benchmark setting is that both countries criminalize prostitution to the same degree. The probability of arrest, the penalty on prostitutes, and the penalty on johns are, respectively, q, κ_b, and κ_s in either country. We then ask what happens when one country legalizes prostitution.

We assume that there is voluntary prostitution in the benchmark setting. Given that the countries are completely identical, we consider the symmetric equilibrium in which the

[24] Of course, the domestic women in this model do not welcome migrant prostitution because it reduces the domestic price of marriage, that is, diverts resources away from their households. This points to conflicts of interest between different constituents with respect to prostitution laws, which we discuss in Section 4.4.

price of sex is

$$p^*_{s,A} = p^*_{s,B} = \frac{w + q\kappa_s}{1 - q - 1/\hat{\sigma}}, \tag{27}$$

the price of marriage is

$$p^*_{m,A} = p^*_{m,B} = \frac{w + q\kappa_s}{1 - q - 1/\hat{\sigma}} - w, \tag{28}$$

the number of prostitutes in each country is

$$n^*_A = n^*_B = \frac{y}{w + q\kappa_s}\left(1 - q - 1/\hat{\sigma}\right), \tag{29}$$

and the number of trafficked women in each country is $n^*_t/2$ where

$$\frac{w + q\kappa_s}{1 - 1/\hat{\sigma}(1-q)} = c(n^*_t). \tag{30}$$

These equations are identical to (6)-(9) except that $\hat{\sigma} \equiv e - q\kappa_b$ replaces σ.

Suppose country A decriminalizes prostitution. The country thus moves to the unregulated equilibrium in which its women and men face the indifference conditions (Ia) and (Ib) with respect to the domestic prices $p_{s,A}$ and $p_{m,A}$. These conditions immediately yield $p_{s,A} = \frac{w}{1-1/\sigma}$, which is smaller than $p^*_{s,A}$ since $\sigma > \hat{\sigma}$. This attracts johns from country B, where prostitution is still illegal, and puts downward pressure on the price of sex there. Indeed, there is demand in country B's sex market only if $\frac{e}{p_{s,A}} \leq \frac{e-q\kappa_b}{p_{s,B}}$, which yields

$$p_{s,B} \leq \frac{\hat{\sigma} w}{\sigma - 1} \tag{31}$$

after substituting for $p_{s,A}$. At the same time, there is supply in country B's sex market only when country-B women weakly prefer prostitution over marriage,

$$(1 - q)p_{s,B} - q\kappa_s \geq p_{m,B} + w, \tag{32}$$

and when country-B men weakly prefer sex to marriage,

$$p_{s,B} \leq \hat{\sigma} p_{m,B}. \tag{33}$$

Thus the sex market in country B is active only if (31)-(33) hold simultaneously. As it turns out, this is impossible.[25] For women in country B to be willing to sell sex at a price so low that they can compete with country A's sex market, the domestic price of marriage must

[25] For example, (31) and (32) jointly imply $p_{m,B} \leq \frac{\hat{\sigma} w}{\sigma-1}(1-q) - w - q\kappa_s$, whereas (32) and (33) jointly imply $p_{m,B} \geq \frac{w+\kappa_s}{(1-q)\hat{\sigma}-1}$. These two inequalities can hold simultaneously only if $\frac{w+\kappa_s}{(1-q)\sigma'-1} \leq \frac{\hat{\sigma} w}{\sigma-1}(1-q) - w - q\kappa_s$. It is easy to show that the last inequality leads to contradiction for $\kappa_s = 0$ and hence a fortiori for $\kappa_s > 0$.

fall. But before it reaches the level at which the women would enter prostitution, it reaches a level at which the men want to get married.

We conjecture instead an equilibrium in which everyone in country B marries and men from country B travel to country A to buy sex. In equilibrium, the men in country B must weakly prefer marriage to buying more sex in country A,

$$\frac{p_{m,B}}{p_{s,A}} e \leq k, \tag{34}$$

and the women in country B must weakly prefer marriage to prostitution,

$$(1-q)p_{s,B} - q\kappa_s \leq p_{m,B} + w. \tag{35}$$

These two conditions can be jointly satisfied.[26] We let men spend the minimum on marriage to maximize their consumption of sex. This means setting $p_{s,B} = \frac{\hat{\sigma} w}{\sigma - 1}$ (see (31)) and choosing $p_{m,B}$ such that (35) binds. This yields

$$p_{m,B} = \max\left\{(1-q)\frac{\hat{\sigma} w}{\sigma - 1} - q\kappa_s - w, 0\right\}. \tag{36}$$

For any lower price of marriage, a woman could sell sex and be better off than in wedlock.

So, in our model, the entire market for sex moves to country A where prostitution is decriminalized, and men from country B become sex tourists. Traffickers also send their victims to country A, where the price of sex is higher. The price of sex falls, as does the price of marriage in both countries. The total level of prostitution, $n = n_A$, is given by $(y - np_{m,A}) + (y - p_{m,B}) = np_{s,A}$, and can be higher than the benchmark setting. The total level of trafficking is given by

$$\frac{w}{1 - 1/\sigma} = c(n_t). \tag{37}$$

A comparison with (30) shows that total trafficking decreases after decriminalization; that is, the solution to (37) is smaller than n_t^*.[27] However, it need not be smaller than $n_t^*/2$.[28] Thus, decriminalization or legalization may raise trafficking in country A even while it reduces trafficking across both countries. This suggests that one should not evaluate the impact of a country's prostitution law on trafficking by looking only at changes in that country, and that one should be careful when interpreting cross-country differences in trafficking levels.

[26] To see this, rewrite (34) as $p_{m,B} \leq \frac{w}{\sigma - 1}$ after substituting for $p_{s,A}$, and (35) as $p_{m,B} \geq (1-q)\frac{\hat{\sigma} w}{\sigma - 1} - w - q\kappa_s$. These inequalities can hold simultaneously only if $(1-q)\frac{\hat{\sigma} w}{\sigma - 1} - w - q\kappa_s \leq \frac{w}{\sigma - 1}$. It is easy to show that the last inequality holds for $\kappa_s = 0$ and hence a fortiori for $\kappa_s > 0$.

[27] This result obtains because we assume that there is voluntary prostitution. If there is initially no voluntary prostitution, decriminalization can increase trafficking (see Section 3).

[28] That would depend on the parameters and the shape of $c(\cdot)$.

Suggestive evidence on such cross-border effects comes from Sweden, which in 1999 passed a law that criminalizes johns. Subsequently, the number of street prostitutes rose in the neighboring countries (The Swedish Government 2010, p. 7):

> We have noted that the prevalence of street prostitution was about the same in the three capital cities of Norway, Denmark and Sweden before the ban on the purchase of sexual services was introduced here, but the number of women in street prostitution in both Norway and Denmark subsequently increased dramatically. In 2008, the number of people in street prostitution in both Norway and Denmark was estimated to be three times higher than in Sweden.

The government report does not explicitly discuss whether the Swedish sex market has simply moved abroad. However, the following four facts facts suggest that this question deserves more attention: First, the report reviews two surveys of Swedish men, both of which showed "that it was more common to buy sex abroad than in Sweden" (p. 32). Second, shortly after the criminalization of johns in Sweden, the number of trafficked Nigerian women in Norway, which borders Sweden to the East, increased dramatically and that, according to a Norwegian organization, the increase was "due, in part, to changes in the prostitution markets in European countries, for example, the criminalization of the purchase of sexual services in Sweden in 1999" (p. 20). Third, the report states that Gothenburg, a Swedish city close to Norway, saw a dramatic increase in trafficked prostitutes from Nigeria after 2009, when sex purchases were criminalized in Norway as well (p. 20). Finally, the report notes that the total number of foreign prostitutes in all three Scandinavian countries—Denmark, Norway, and Sweden—has increased since the Swedish law was passed.

5.3 *Laws and norms*

Law may affect behavior not only through enforcement but also through an expressive role: It can affect social norms (see, e.g., Benabou and Tirole 2011). If so, legalizing prostitution may make both the purchase and sale of commercial sex socially more acceptable (Kotsadam and Jakobsson 2011). The simplest way of incorporating this aspect into the model is to assume that legalization (criminalization) increases (decreases) the intrinsic value that women derive from prostitution and men derive from buying sex. To isolate this aspect we also abstract from actual enforcement and assume that criminalization is merely nominal; that is, $q = 0$.

So, suppose a man's utility from buying a unit of sex is e when prostitution is legal and $e - g_b$ otherwise. Similarly, a woman's utility from selling a unit of sex is p_s when prostitution is legal and $p_s - g_s$ otherwise. The disutilities g_b and g_s can be interpreted as guilt or stigma. It is immediately apparent that in our model g_b and g_s have the same

impact as expected criminal penalties. We can therefore apply the results from Section 3: Legalization increases overall prostitution but need not increase trafficking—on the contrary, it can reduce it. Even the intuition is the same. Stigma associated with prostitution deters voluntary prostitutes but not traffickers, who do not care about the stigma borne by their victims. Norms that reduce voluntary prostitution can therefore create more room for trafficking. Absent voluntary prostitution, stigmatizing johns decreases trafficking, while stigmatizing prostitutes does not. By the same token, in countries where norms against prostitution are strong, and voluntary prostitution is hence low, criminalization of johns is likely to deter trafficking.

5.4 *Political support*

In our model, prostitution can be a welcome institution. To begin with, irrespective of marital status, the men always prefer prostitution to be legal. Legalization reduces the price of sex and hence the price of marriage as well. The men benefit from both marriage and sex (reproductive and non-reproductive sex) being cheaper. So, if anyone, it is women who want to criminalize prostitution. But not even that is necessarily the case. Voluntary prostitutes do not necessarily gain from abolishing the sex market. This is, for example, the case when (former) prostitutes find it difficult to marry or face worse job alternatives.

By means of illustration, suppose the female wage decreases in the number of women in regular jobs. For the sake of argument, suppose it is $w = \gamma_w n$. A voluntary prostitute's income, p_s, is then given by the solution to (1)-(3) except that $\gamma_w n$ replaces w in (1). Solving this system of equations yields two possible equilibrium outcomes (one with few prostitutes and one with many), with a prostitute's income being

$$p_s = \frac{\sigma\gamma_w}{\sigma - 1}\left(\frac{1}{2(\sigma-1)} \pm \sqrt{\frac{1}{4(\sigma-1)^2} - \frac{y}{\gamma_w}}\right), \tag{38}$$

provided that the root is positive, which is true for $\gamma_w/y \leq 4(\sigma-1)^2$.

By comparison, if the government were to criminalize johns so severely that all and any prostitution is deterred, all women, then married, would simply earn y. Voluntary prostitutes prefer prostitution to remain legal when (38) is larger than y. This is, for example, always true in the equilibrium with few prostitutes.[29]

In contrast, suppose there are no voluntary prostitutes, which is more likely the case when lucrative jobs for women are ample and the gender income inequality is small (that is, when w is largely independent of n and y/w is small). In this case, women are unanimously in favor of

[29] Suppose $\gamma_w/y \leq 4(\sigma-1)^2$, that is, the root is positive. Setting the root to zero, we get a lower bound on the larger of the two solutions in (38): $\frac{\sigma\gamma_w}{2(\sigma-1)^2}$. It is simple to show that this is larger than y, given that the root is positive.

criminalizing prostitution. Not only would the criminalization lower the probability of their being abducted by traffickers, but it would also increase the price of marriage by decreasing men's consumption of commercial sex (from involuntary prostitutes). The political support for criminalization, especially of johns, should thus increase with the degree of gender income equality (which reduces voluntary prostitution) and with income levels (which increases the demand for trafficking).

South Korea offers an interesting anecdote. In 2004, its government adopted the Swedish law of criminalizing only johns, pimps, and brothel owners and raised the criminal penalties. When the law was enacted, South Korean sex workers took to the streets (Salmon 2004):

> [E]nforcement of the law has also sparked angry showdowns between women in favor of the law and those against it. When the crackdown began, fistfights were reported between prostitutes and women activists ...
>
> Some in the industry defend the trade. "I think wives' associations are behind the crackdown," said Park Song Bok, 49, who manages a bar in the red-light district of Itaewon and has been in the industry for more than 20 years. "But what about single guys?" she said. "And married men always hide some money to pay for it."

Sex worker rallies against the ban on prostitution have since recurred in South Korea (e.g., AP News 2011). Unlike the other countries that have adopted the Swedish model, South Korea has a very high male-female income ratio. The others – Sweden, Norway, and Iceland – have the lowest male-female income ratios in the world (OECD Gender, Institutions and Development Database (2009), Table 2), and they have had hardly any public demonstrations against the law.

6. Conclusion

Our theoretical analysis of how prostitution laws affect voluntary prostitution and sex trafficking yields several conclusions. First, if the regulator aims to eradicate trafficking and restore the equilibrium that would arise in an unregulated market without traffickers, then the optimal regulatory framework combines licensed prostitution with severe criminal penalties on johns who purchase sex from unlicensed prostitutes. So far this model has not been implemented by any country, even though it is a combination of two existing regulatory frameworks. Second, if the objective is to abolish all – voluntary and involuntary – prostitution, the Swedish model of criminalizing all demand is the optimal regulatory framework. In the absence of voluntary prostitution, the Swedish model and the aforementioned one are equivalent. Finally, criminalizing johns is always superior to criminalizing prostitutes. The

former is more effective against trafficking and comes without the by-product of inflicting criminal penalties on trafficking victims.

A central positive implication of our model is that the male-female income ratio is a key determinant of trafficking levels, the impact of prostitution laws, and the political support for such laws. A lower ratio reduces voluntary prostitution and thereby raises trafficking. With fewer voluntary prostitutes, criminalizing prostitution is more likely to reduce trafficking, and finds more political support. Conversely, when the ratio is high, voluntary prostitution is more prevalent, political support for a ban on prostitution weaker, and such a ban is more likely to raise trafficking. To our knowledge, these predictions have not yet been tested.

Although the focus of this paper is the market for sex, our analysis in principle applies to other markets in which one side is voluntary but *part of* the other side is coerced. Examples include any other labor market supplied by human traffickers, or the market for organs where the analogue of the regulatory problem considered in this paper is that of curbing coercive organ trafficking while allowing for voluntary organ donations.

References

[1] Acemoglu, Daron and Alexander Wolitzky. 2011. "The Economics of Labor Coercion," *Econometrica*, 79: 555-600.

[2] Akee, Randall, Arjun S. Bedi, Arnab K. Basu, and Nancy H. Chau. 2010. "Transnational Trafficking, Law Enforcement and Victim Protection: A Middleman's Perspective," IZA Discussion Paper No. 6226.

[3] AP News. 2011. "South Korean Sex Workers Rally to Protest Stricter Laws," September 22.

[4] Arunachalam, Raj and Manisha Shah. Forthcoming. "Compensated for Life: Sex Work and Disease Risk," *Journal of Human Resources.*

[5] Austin, Ian. 2010. "Canada: Brothel Ban Illegal, Court Says," *New York Times*, March 27.

[6] Becker, Gary, Kevin Murphy, and Michael Grossman. 2006. "The Market for Illegal Goods: The Case of Drugs," *Journal of Political Economy,* 114:38–60.

[7] Benabou, Roland, and Jean Tirole. 2011. "Laws and Norms," NBER Working Paper No. 17579.

[8] Cameron, Samuel and Alan Collins. 2003. "Estimates of a model of male participation in the market for female heterosexual prostitution services." *European Journal of Law and Economics,* 16:271–88.

[9] Cho, Seo-Young, Axel Dreher, and Eric Neumayer. Forthcoming. "Does Legalized Prostitution Increase Human Trafficking?" *World Development.*

[10] Chuang, Janie A. 2010. "Rescuing Trafficking from Ideological Capture: Prostitution Reform and Anti-trafficking Law and Policy," *University of Pennsylvania Law Review*, 158: 1654–1728.

[11] Cizmar, Martin, Ellis Conklin, and Kristen Hinman. 2011. "Real Men Get Their Facts Straight," *Village Voice News*, June 29.

[12] Collins, Adam and Guy Judge. 2010. "Differential enforcement across police jurisdictions and client demand in paid sex markets," *European Journal of Law and Economics*, 29:43–55.

[13] Della Giusta, Marina, Maria Laura Di Tommaso, and Steinar Strøm. 2009. "Who is watching? The market for prostitution services. *Journal of Population Economics*, 22(2): 501–516.

[14] Ditmore, Melissa. 2009. "Sex and Taxes," *The Guardian*, 16 April.

[15] Edlund, Lena, Joseph Engelberg, and Christopher A. Parsons. 2009. "The Wages of Sin," Columbia University Discussion Paper No. 0809-16.

[16] Edlund, Lena and Evelyn Korn. 2002. "A Theory of Prostitution," *Journal of Political Economy*, 110:181–214.

[17] Estes, Richard J., and Neil A. Weiner. 2001. "The Commercial Sexual Exploitation of Children in the U.S., Canada and Mexico," University of Pennsylvania Working Paper.

[18] European Women's Lobby. 2012. Conference entitled "10 years of policies on prostitution: outcomes of the Swedish and Dutch options, and ways forward," December 4. (Information retreived online on November 30, 2013, at http://www.womenlobby.org/news/ewl-news/article/10-years-of-policies-on)

[19] Farley, Melissa, Emily Schuckman, Jacqueline M. Golding, Kristen Houser, Laura Jarrett, Peter Qualliotine, and Michele Decker. 2011. *Comparing Sex Buyers with Men Who Don't Buy Sex: "You Can Have a Good Time with the Servitude" vs. "You're Supporting a System of Degradation."* San Francisco, CA: Prostitution Research & Education.

[20] Farmer, Amy and Andrew W. Horowitz. 2013. "Prostitutes, Pimps, and Brothels: Intermediaries, Information, and Market Structure in Prostitution Markets." *Southern Economic Journal*, 79(3): 513–528.

[21] Gertler, Paul, Manisha Shah, and Stefano M. Bertozzi. 2005. "Risky Business: The Market for Unprotected Commercial Sex," *Journal of Political Economy,* 113:518–550.

[22] Friebel, Guido and Sergei Guriev. 2006. "Smuggling Humans: A Theory of Debt-Financed Migration," *Journal of the European Economic Association,* 4(6):1085–1111.

[23] Global Slavery Index 2013. (Retrieved on November 30, 2013, at http://www.globalslaveryindex.org/)

[24] Jakobsson, Niklas and Andreas Kotsadam. Forthcoming. "The Law and Economics of International Sex Slavery: Prostitution Laws and Trafficking for Sexual Exploitation," *European Journal of Law and Economics.*

[25] Kara, Siddharth. 2009. *Sex Trafficking: Inside the Business of Modern Slavery.* New York, NY: Columbia University Press.

[26] Kotsadam, Andreas and Niklas Jakobsson. 2011. "Do Laws Affect Attitudes? An Assessment of the Norwegian Prostitution Law Using Longitudinal Data." *International Review of Law and Economics*, 31:103–115.

[27] Kleiner, Morris M. and Alan B. Krueger. 2013. "Analyzing the Extent and Influence of Occupational Licensing on the Labor Market," *Journal of Labor Economics*, 31(2), The Princeton Data Improvement Initiative: S173-S202.

[28] Kristof, Nicholas D. 2012a. "How Pimps Use the Web to Sell Girls," *The New York Times*, January 25.

[29] Kristof, Nicholas D. 2012b. "Not Quite a Teen, Yet Sold for Sex," *The New York Times*, April 18.

[30] Levitt, Steven D. and Sudhir A. Venkatesh. 2007. "An Empirical Analysis of Street-Level Prostitution." University of Chicago Working Paper.

[31] MacKinnon, Catherine A. 2011. "Trafficking, Prostitution, and Inequality," *Harvard Civil Rights-Civil Liberties Law Review*, 46(2):271–309.

[32] Organization of Economic Cooperation and Development. *Gender, Institutions and Development Database.* (Retreivedon May 2, 2012, at http://stats.oecd.org/Index.aspx?DatasetCo de=GID2)

[33] Rao, Vijayendra, Indrani Gupta, Michael Lokshin, and Smarajit Jana. 2003. "Sex Workers and the Cost of Safe Sex: The Compensating Differential for Condom Use among Calcutta Prostitutes." *Journal of Development Economics,* 71:585–603.

[34] Robinson, Jonathan, and Ethan Yeh. 2011. "Transactional Sex as a Response to Risk in Western Kenya." *American Economic Journal: Applied Economics,* 3:35–64.

[35] Salmon, Andrew. 2004. "South Korea Targets Sex Trade, For Now," *The New York Times*, October 19.

[36] Simons, Marlise. 2008. "Amsterdam Tries Upscale Fix for Red Light District Crime," *The New York Times*, February 24.

[37] Smith, Craig S. 2005. "Turkey's sex trade entraps Slavic women," *The New York Times*, June 27.

[38] The Economist. 2013. "A giant Teutonic brothel – Has the liberalisation of the oldest profession gone too far?," November 16, 2013.

[39] The Guardian. 2013. "Campaigners protest against United Nations stance on prostitution," September 21, 2013.

[40] The Swedish Government. 2010. *Selected extracts of the Swedish government report SOU 2010:49:—The Ban against the Purchase of Sexual Services. An evaluation 1999-2008*. (Retrieved on May 15, 2012, at http://www.turnoffthereddlight.ie/wp-content/uploads/2011/02/Swedish-evaluation-full-trasnlation.pdf)

[41] United Nations Office on Drugs and Crime (UNODC). 2012. *Global Report on Trafficking in Persons*. (Retrieved on November 30, 2013, at http://www.unodc.org/documents/data-and-analysis/glotip/Trafficking_in_Persons_2012_web.pdf)

[42] United States Department of State. 2011. Trafficking In Persons Report. (Retrieved on November 30, 2013, at http://www.state.gov/j/tip/rls/tiprpt/2011/)

[43] Weitzer, Ronald. 2012. "Sex Trafficking and the Sex Industry: The Need for Evidence-Based Theory and Legislation." *Journal of Criminal Law and Criminology,* 104:1337-1370.

[44] Whaley, Sean. 2010. "State Lawmaker Plans To Continue Mission In 2011 To Combat Child Prostitution In Nevada," Nevada News Bureau, September 29.

[45] Woolston, Howard B. 1921. *Prostitution in the United States*. Publications of tbe Bureau of Social Hygiene. New York: The Century Co.

[46] United Nations. 1959. *Study on Traffic in Persons and Prostitution*. New York: United Nations Department of Economic and Social Affairs.

Figures

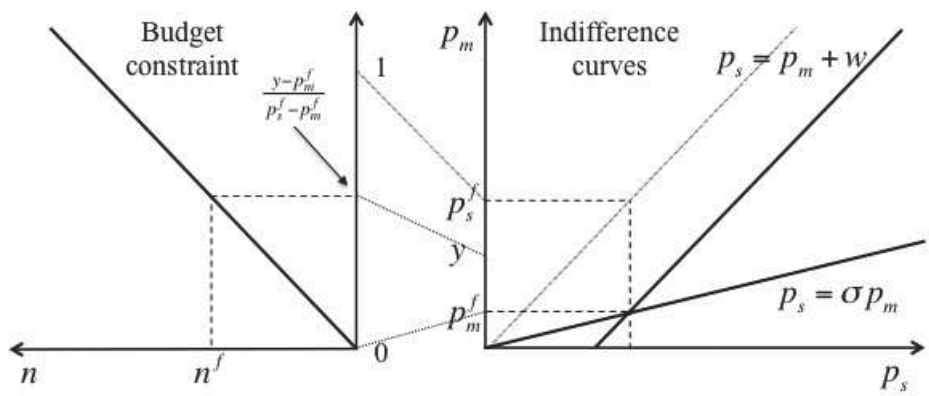

Figure 1: This figure shows the equilibrium in the absence of trafficking. The indifference curves in the right graph determine the prices of sex and marriage. Given these prices, the left graph uses the budget constraint to determine the supply of voluntary prostitution.

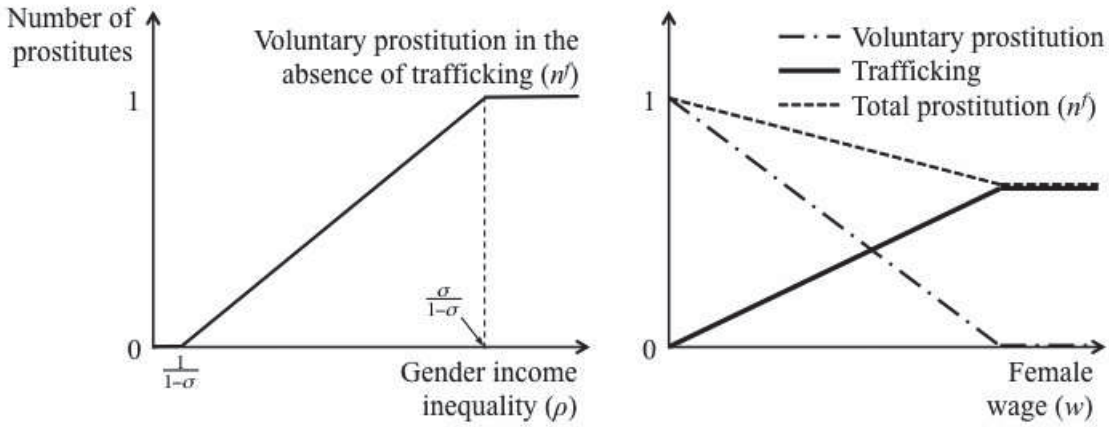

Figure 2: The left graph shows how the male-female income ratio ρ affects voluntary prostitution in the absence of trafficking. The right graph shows how the female wage w affects trafficking.

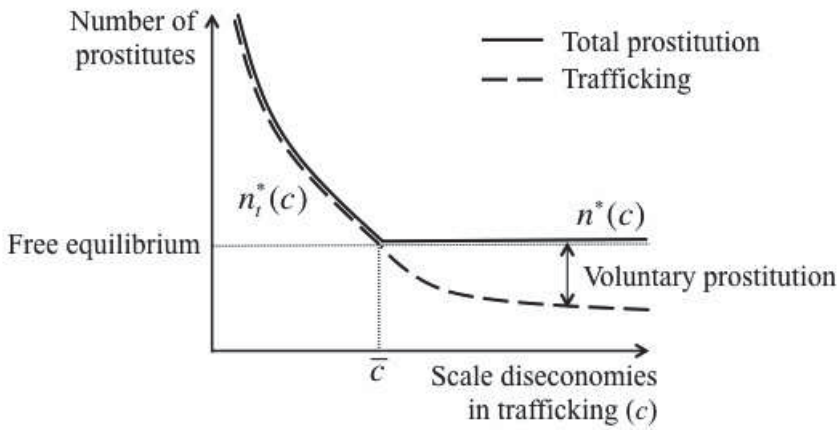

Figure 3: This graph shows how changes in the costliness of trafficking affect the total level of prostitution as well as its decomposition into voluntary prostitution and trafficking.

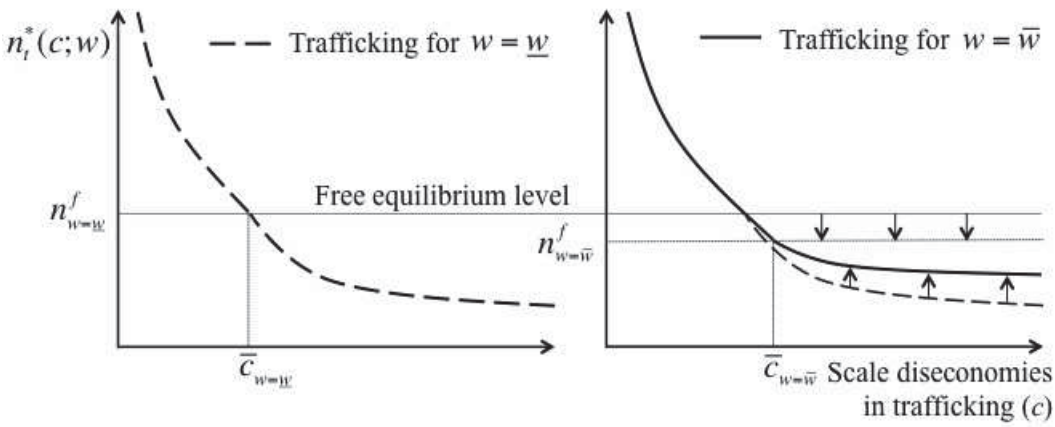

Figure 4: This figure shows that an increase in female wages from $\underline{w}$ (left graph) to $\overline{w}$ (right graph) weakly decreases total prostitution but weakly increases trafficking.

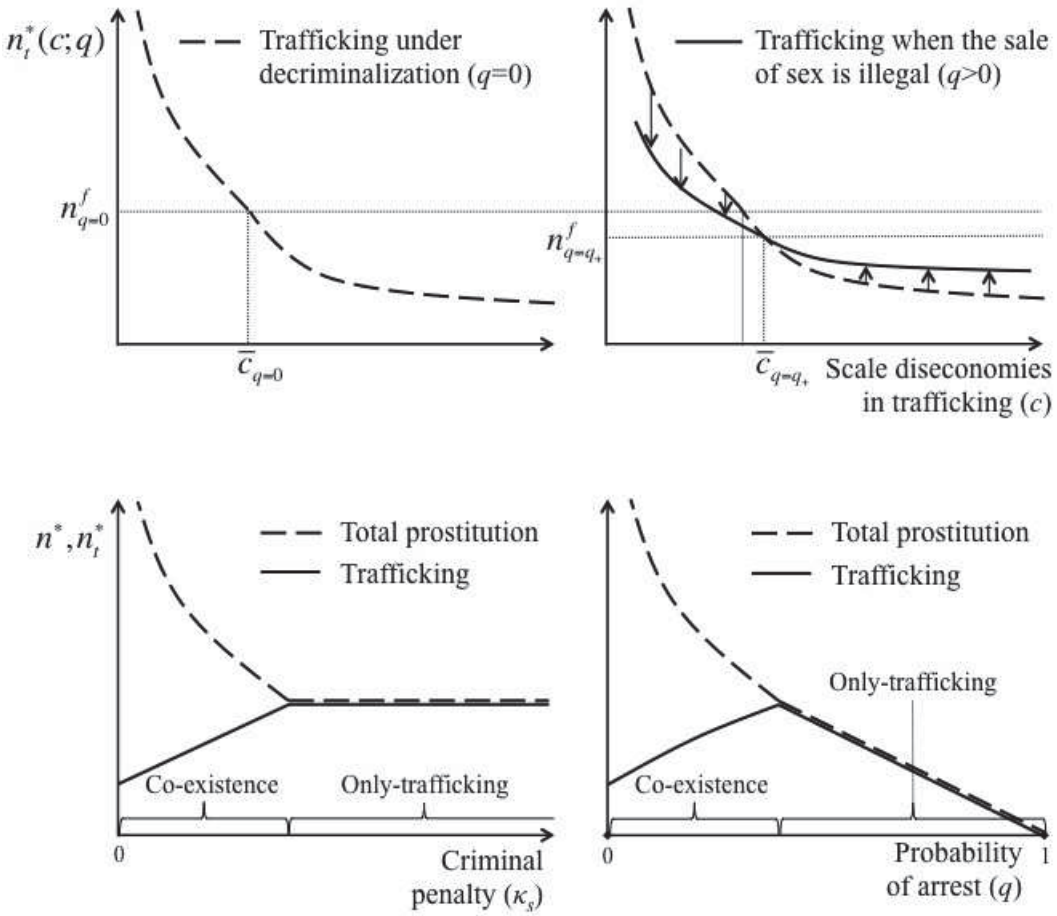

Figure 5: The top row shows how a change from decriminalization (left graph) to criminalizing prostitutes (right graph) affects trafficking. The bottom row shows how trafficking and total prostitution vary with the criminal penalty κ_s (left graph) and the arrest probability q (right graph) when prostitutes are criminalized.