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Human Trafficking and Regulating Prostitution

Samuel Lee
NYU Leonard N. Stern School of Business, slee@stern.nyu.edu

Petra Persson
Columbia University; Research Institute of Industrial Economics (IFN), pmp2116@columbia.edu

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Samuel Lee[†]   Petra Persson[‡]

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Abstract

We model a semi-coerced market for sex with voluntary prostitutes and trafficking. Trafficking victims generally constitute a non-zero share of supply in a decriminalized market. We analyze whether prostitution laws can restore the socially optimal outcome that would arise in a decriminalized market free from trafficking. No regulatory regime currently used in practice accomplishes this goal, but a novel policy, which combines the "Dutch" and "Swedish" regimes, would. Our analysis offers guidance for empirical studies on the impact of prostitution laws, and is pertinent to the debate on decriminalization of prostitution.

Keywords: Prostitution, trafficking, contemporary slavery, illegal goods, organ trade

1 Introduction

Markets for sex and markets for human organs are examples of *semi-coerced* markets, where voluntary (socially desirable) supply often co-exists with coerced (undesirable) supply. Despite their size and policy relevance, to the best of our knowledge, there exists no analysis of the optimal regulation of semi-coerced markets. This paper models a semi-coerced market for sex with two types of supply, voluntary prostitution and sex trafficking. We ask whether there exists a policy that can restore the outcome that would arise in a deregulated market absent coerced supply, that is, absent sex trafficking.[1]

The regulation of sex markets has long been controversial, and the debate was recently revived ensuing Amnesty International's decision, in the fall of 2015, to support worldwide decriminalization of all aspects of sex trade: supplying, demanding, and mediating (pimping) transactions.[2] On one hand, critics worry that decriminalization facilitates and boosts sex trafficking. Voluntary sex workers, on the other hand, argue that decriminalization helps all suppliers – voluntary as well as coerced – in that bringing the sex market out of the shadows improves their opportunities to get health check-ups and seek help from the police.

Thus, while both sides condemn sex trafficking, there is little consensus on how to combat it. Since direct prosecution of traffickers is difficult, the search for alternative means routinely turns into a debate on whether prostitution should be banned,[3] in which, as the Amnesty controversy illustrates, there are two key points of contention: The first concerns the *impact of prostitution laws*. One side argues that decriminalizing prostitution invites trafficking, the other that any ban is at best ineffective against traffickers. The second involves a *conflict of interest*. In any case, criminalization comes at the expense of voluntary sex workers, forcing them underground where their safety is more likely to be compromised.[4]

This lack of consensus on optimal policy is reflected in the diversity of current laws, which includes criminalization of prostitutes ("Traditional model"), criminalization of johns ("Swedish model"), licensed prostitution ("Dutch model"), and decriminalization. It does not

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[1] The problem of human trafficking has attracted growing attention in recent years. Estimates on criminal activities are always imprecise, but it has been suggested that nearly 30 million live currently in involuntary servitude (Global Slavery Index, 2013) and 600,000 are trafficked per year in the sex industry (Kara, 2009). These large numbers have sparked public outrage and interest in initiatives to combat trafficking.

[2] The discourse on prostitution policy has a long history (e.g., United Nations, 1959; Woolston, 1921). For a recent exposition of the main arguments in the public debate, see The New York Times (2012, 2015). For a broader discussion, see e.g., Chuang (2010) and MacKinnon (2011).

[3] According to the U.S. Department of State (2012), in 2011, 4,239 out of 7,206 suspects were convicted of trafficking worldwide, and 41,210 trafficking victims were identified. While significant in absolute terms, conviction rates are small in comparison to overall trafficking estimates (at approximately 10 percent).

[4] Like Amnesty International, a UN commission cited such concerns in its call to decriminalize prostitution worldwide (The Guardian, 2013).

Country	Prostitution	Soliciting	Pimps/Brothels	Top Destination for Trafficking?
USA				
Thailand				
Japan	Partly Illegal[b]		Illegal[a]	
Israel				
Italy	Decriminalized			Yes
Spain			Partly Illegal[c]	
Belgium				
Netherlands		Regulated		
Germany				
Turkey				
Sweden	Partly Illegal[d]		Illegal	No

[a] In Nevada, some counties allow regulated brothels.
[b] Only the sale of *coital* sex is illegal.
[c] Brothels are not illegal, but *exploitative* management of brothels or prostitutes ("pimping") is.
[d] Only the *purchase* of sex is illegal.

Table 1: Prostitution laws around the world.

further the debate that top destination countries for sex trafficking span all standard policies except the Swedish model (Table 1). Our theoretical analysis of a semi-coerced market for sex offers five takeaways:

- Decriminalizing the market for sex protects voluntary sex workers, but it generally fails to eradicate sex trafficking.

- Relative to decriminalization, criminalizing the sale or purchase of prostitution may raise trafficking as long as there is voluntary prostitution. The effect of criminalization on trafficking is on the margin non-monotonic, and the overall impact of a specific law on trafficking depends on the extent of voluntary prostitution.

- The Swedish model dominates any regime that involves criminalization, and the Dutch model dominates decriminalization. Choosing between the Swedish and Dutch models pits the protection of trafficking victims against the safety of voluntary prostitutes.

- A hybrid Dutch-Swedish model – licensing prostitutes and criminalizing the *clients* of unlicensed prostitutes – resolves this tension and restores the socially optimal outcome that would arise in a deregulated market absent coerced supply. It thus dominates all currently existing policies across the "impact-on-trafficking" and "conflict-of-interest" dimensions.

- The impact of a law on the level of trafficking depends on factors that, in themselves, influence the political support for the adoption of such laws. Also, in the presence of sex tourism, laws that raise trafficking in(to) one country may lower global trafficking. This offers guidance for empirical studies on the effects of prostitution laws.

Key to our framework is an explicit differentiation between *voluntary* and *coerced* supply. Voluntary prostitutes choose to sell sex because it is lucrative, or find themselves "forced" to do so by economic circumstance. In either case, they find prostitution preferable to whatever alternatives are available to them, i.e., to their outside option. The income from prostitution must consequently at least match their forgone income from alternative job opportunities.[5] Empirically, prostitution seems better-paid than other low-skill, labor-intensive professions. The existing economic literature on prostitution proposes two primary explanations for this premium: a compensating differential for (i) *occupational hazards* such as increased health risks (Rao et al., 2003; Gertler et al., 2005; Levitt and Venkatesh, 2007; and Arunachalam and Shah, 2013) and (ii) *reduced mating opportunities* (Edlund and Korn, 2002; Edlund et al., 2009). Which differential matters more is an empirical question, and may vary depending on context or market segment. Rather than take a specific stance, we choose an integrative framework that allows voluntary supply to depend on occupational hazards as well as forgone opportunities in both labor and mating markets.[6]

In contrast, involuntary prostitutes are coerced into prostitution by traffickers who extort their income. Formally, coercion can be thought of as a labor relationship in which the employer relaxes the employee's participation constraint by lowering the latter's reservation utility, e.g., through the threat of violence (Acemoglu and Wolitzky, 2011).[7] So, while traffickers bear the costs of running their criminal activity, they do not internalize their victims' "participation" costs, such as forgone opportunities and certain occupational hazards. The coercive labor relationship between traffickers and their victims thus creates specific cost differences between voluntary and coerced supply, differences that affect the elasticity of the two modes of supply to criminalization.

The coexistence of voluntary and coerced supply has two other unorthodox implications for market regulation. First, while the traditional policy objective in most of the literature on illegal goods – which prostitution is often counted as, alongside illicit narcotics and weapons – is to decrease consumption of the good in question (Becker, Murphy, and Grossman, 2006), the regulatory problem considered in this paper is different: The government does not want to deter consumption per se, but only one particular mode of supply. So, the optimal policy

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[5]Robinson and Yeh (2011) show evidence from Kenya that the supply of prostitution increases in response to negative income shocks.

[6]Della Giusta et al. (2009) propose social stigma as another explanation for the premium. In our model, social stigma would be functionally equivalent to occupational hazards, and in addition, could be cast as a contributing factor to disadvantages in the mating market.

[7]Our framework assumes, for simplicity, the limit case where employers (traffickers) are so coercive that they completely undo their employees' (victims') participation constraints, and hence internalize none of the latter's opportunity or participation costs. Friebel and Guriev (2006) consider a different variant of trafficking in their theory of human smuggling. In their model, illegal migrants may agree ex ante to temporary bondage ex post at the destination as a "commitment" to repay their smugglers for financing the transport. In this case, no (ex ante) partipation constraints are violated in the (migrants') entry decision.

does not eliminate all prostitution, but eradicates trafficking without infringing on voluntary prostitution. This is the regulatory problem in any market with voluntary (socially desirable) and coerced (socially undesirable) supply, markets that we refer to as *semi-coerced*. Second, the question of whether policies should target supply or demand takes on more significance in semi-coerced markets because demand and supply may differ in the degree to which market entry is voluntary.

Our analysis begins with the outcome in an unregulated, or decriminalized, market. We show that decriminalization protects voluntary suppliers, but in general cannot eradicate trafficking.

We then analyze the traditional model and the Swedish model, which criminalize the sell and buy sides, respectively. Our results contradict the "indirect taxation" argument for criminalization, namely that costs imposed on sex transactions ("final goods") are passed on to traffickers ("intermediate producers"), thus curbing their activity. Indeed, we show that criminalization *subsidizes* traffickers. This counterintuitive finding stems from the coercive labor relationship between traffickers and their victims: Because of coercion, the costs of criminalization fall *unequally* on voluntary prostitutes and traffickers, whereas the consequent adjustment in market prices affects them *equally*.

More precisely, some costs from criminalization, such as revenue losses, affect voluntary prostitutes and traffickers equally. Other costs affect the two modes of supply differentially. For example, changes in experiential hazards (such as jail time, health risks from working underground, and lack of protection from violent clients) are borne by voluntary prostitutes, but not by traffickers.[8] Criminalization also induces an equilibrium shift that increases the mating market opportunity cost of prostitution, which traffickers fail to internalize.[9]

Advocates of criminalization may argue that it still helps that traffickers bear *some* cost. But this argument neglects that market prices adjust to (supply responses to) cost changes. As long as the marginal supplier is voluntary, criminalization raises the equilibrium price to compensate for both expected revenue losses and for increased occupational hazards and opportunity costs of prostitutes. Unfortunately, this market price increase *overcompensates* traffickers, who do not bear the increased occupational hazards and opportunity costs.

In our framework, criminalization thus has a non-monotonic effect: A marginal rise in criminalization (e.g. a higher arrest probability) increases trafficking so long as there is any voluntary supply, but reduces trafficking once all voluntary suppliers have left the market. Consequently, the impact of criminalization on trafficking hinges on the initial prevalence of

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[8]Cunningham and Shah (2014) and Nguyen (2015) provide evidence from natural experiments that criminalization has a causal positive impact on certain experiential hazards of prostitution (sexually transmitted diseases and sexual violence).

[9]Intuitively, criminalizing prostitution makes sex generally more expensive, which raises the "price" also of substitute sources of sex, such as mating. Thus, as prostitution retreats, equilibrium mating improves.

voluntary prostitution. The prevalence of voluntary prostitution, in turn, depends upon the severity of occupational hazards, intrinsic demand factors, and gender income differences. In a nutshell, this means that the impact of criminalization is highly context-dependent. For example, it may curb trafficking in countries with high gender income equality, but backfire where female labor market participation is low.

Despite the ambiguous effect of criminalization relative to decriminalization, our framework offers a conceptual ranking of the two criminalization approaches. We ask, in the spirit of Posner (1985), whether there exists a level of criminal penalties that could completely eliminate trafficking – the aim of criminalization.[10] Since the Swedish model attacks johns who are not coerced, it can in principle deter all of the demand and hence eradicate trafficking. By contrast, any criminal penalties imposed on prostitutes weakly increase trafficking and inflict additional harm on victims. The Swedish model thus dominates the traditional model.

We then analyze the final existing legislative regime: licensed prostitution, i.e., the Dutch model. In many industries, occupational licensing is controversial. Proponents argue that licencing ensures quality of supply. Critics counter that it only serves to create cartel rents within the licensed occupation by reducing supply, and instead favor *certification*, which would convey the same information about quality, but not restrict low-quality entry.[11] In the context of prostitution, this criticism does not apply as the cartel effect *is* the regulatory objective: licensing is employed to weed out "low-quality" supply, i.e., trafficked prostitutes. We show that so long as the Dutch model can accomplish the intended restriction in licensed supply – by not granting licenses to trafficking victims – it strictly dominates decriminalization, even though trafficking will persist in the unlicensed "underground" market.

Having shown that the Swedish model dominates the traditional model, and that the Dutch model dominates decriminalization, we proceed to compare the two "winners" among the existing legislative regimes, the Swedish and Dutch models.[12] This reveals a trade-off: The Dutch model is preferred by voluntary prostitutes, but it cannot eradicate trafficking, which persists underground serving customers that do not care whether their counterparty is licensed.[13] The Swedish model, in contrast, can eradicate sex trafficking, but only after eliminating all voluntary supply. Choosing between these two models thus pits the interests

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[10]Those familiar with Posner (1985) may notice that our reasoning does not fully comply with his theory. In Posner's theory, the goal of criminal punishment is to deter the criminal offense *in order to push agents towards voluntary, compensated market exchanges.* In our thought experiment, the criminalization does not distinguish between the crime (i.e., trafficking) and voluntary market exchanges.

[11]Kleiner and Krueger (2013) estimate that about 30% of the U.S. labor force works in licensed occupations and provide evidence in support of the criticism.

[12]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).

[13]This is because the traditional system of (enforcing) occupational licensing is designed to protect consumers in voluntary markets, rather than protecting suppliers from coercion.

of voluntary prostitutes against those of trafficking victims.

From this one may be tempted to conclude that the tension between these two objectives is inevitable in prostitution market regulation. But in the last section of our main analysis, looking beyond the policies that currently exist around the world, we show that it is possible to design a policy that reconciles both objectives.

This optimal policy is a novel, hybrid one that combines the Dutch and Swedish models: Licensing prostitutes and criminalizing (only) johns that purchase sex from unlicensed prostitutes. This approach can both eradicate trafficking and restore the equilibrium that would emerge in an unregulated market without coercion. It dominates the Dutch model because it targets illicit demand, which is purely voluntary.[14] And it dominates the Swedish model because voluntary transactions are not eliminated – they are merely channeled into a "safe harbor." In terms of practical enforcement, the hybrid policy, while hitherto untested, faces the same implementation challenges as the Dutch and Swedish models, which are currently in place in various places around the world.

In the final part of the paper, we explore extensions of the model that offer three points of guidance for empirical research.[15] First, the impact of a prostitution law on trafficking is context-dependent, which cautions against applying findings from one country to others. Even if, say, the introduction of criminalization reduces trafficking in one country, it may raise trafficking if adopted elsewhere. Second, the political support for a prostitution law is also context-dependent and endogenous to the same factors that determine the law's effect on trafficking. This further reinforces the concern that policies adopted effectively by some countries may backfire in those countries that have not adopted them. Third, in the presence of cross-border flows, a country's law change may raise its own trafficking (in)flow less than it reduces trafficking elsewhere. A partial equilibrium perspective may hence obscure global equilibrium effects: Countries with the largest *local* trafficking (in)flows could in fact be the ones whose policies most reduce trafficking at the *global* scale.

Our theoretical framework is, to the best of our knowledge, the first to integrate voluntary prostitution and trafficking within a single framework and microfound differences in their response to criminalization, or more generally, to analyze optimal regulation of semi-coerced markets. Edlund and Korn (2002) and Della Giusta et al. (2009) develop positive theories of voluntary prostitution. Akee et al. (2014) focus exclusively on trafficking flows, and study how law enforcement affects those flows in a transnational setting. Cameron and Collins

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[14]Here, the logic of Posner (1985) applies: Criminal penalties so high that they fully deter demand in the unlicensed sector *promote voluntary market transactions* in the licensed sector (cf. footnote 10).

[15]There is relatively little empirical work on the impact of prostitution laws on trafficking because of the lack of data. Recent work by Cho et al. (2013) and Jakobsson and Kotsadam (2013) has made important progress with indices based on data by the United Nations Office of Drugs and Crime (UNODC) and the International Labour Office (ILO). Both studies find that countries with stricter laws against prostitution are correlated with smaller trafficking (in)flows.

(2003) and Collins and Judge (2008) study demand-side determinants. Farmer and Horowitz (2013) analyze the role of pimps as non-coercive intermediaries. Last, in separate work, Lee and Persson (forthcoming) study the influence of prostitution laws on violence encountered by *voluntary* prostitutes inside the market for sex.

The remainder of the paper is organized as follows. Section 2 presents the model and analyzes the equilibrium in a decriminalized prostitution market. Section 3 analyzes criminalization (the traditional and Swedish models), and Section 4 analyzes licensed prostitution (the Dutch model). Section 5 explores extensions of the model and discusses its relevance for empirical research. Section 6 offers concluding remarks.

2 Decriminalized prostitution

This section presents in two steps a model of a prostitution market in which there are no prostitution laws. We first derive the equilibrium outcome that would obtain in the absence of coercion, i.e., if all prostitution were voluntary. In the second step, we add sex trafficking and describe its impact on the equilibrium outcome.

2.1 Voluntary prostitution

The choice whether to become a prostitute trades off the expected income from prostitution against the costs. The equilibrium income (or price) of a prostitute therefore reflects those costs. The economic literature on prostitution has focused on two kinds of costs to explain the relatively high price of prostitution: occupational hazards, such as increased disease risk (Rao et al., 2003; Gertler et al., 2005; Arunachalam and Shah, 2013) and mating opportunity costs (Edlund and Korn, 2002; Edlund et al., 2009). Our framework integrates both of these views.[16]

Consider a mass of females and males with the size of each group normalized to one.[17] Each person has one unit of labor to supply, and there is an exogenous labor market where men face wage y and women wage w. Sexual interaction occurs in two markets: First, there is a market for monogamous mating, or reproductive sex. Men place value k on mating and must pay spouses a "price of marriage" p_m. Second, there is a market for prostitution, or non-reproductive sex, which is sold at unit price p_s and valued by men at e per unit. A woman can convert her unit of labor supply to $s > 1$ units of non-reproductive sex, but the occupational hazards of prostitution impose disutility h on her. For simplicity, we assume

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[16]As it turns out, the key mechanisms underlying our results operate, in effect, equally via either channel.

[17]This implies a sex ratio of one. It is straightforward to extend our model to other sex ratios, with the simple effect that the demand for prostitution increases with the share of men. We abstract from this effect in our analysis to focus on other determinants of prostitution.

that women value neither mating nor non-reproductive sex intrinsically.[18]

Each woman chooses *either* to be a prostitute *or* to be a wife and work in the "alternative" labor market, and maximizes her total income.[19] Each man allocates his whole labor income to marriage or prostitution (or to both), and maximizes his consumption utility. We denote the number of prostitutes (and hence, by construction, that of unmarried men) by n.[20]

Defining the following parameters will facilitate the exposition of our analysis:

$$\omega \equiv w + h \qquad \text{(effective female wage)}$$

$$\rho \equiv \frac{y}{\omega} \qquad \text{(effective wage ratio)}$$

$$\sigma \equiv \frac{se}{k} \qquad \text{(preference ratio)}$$

Since h can equivalently be seen as a "premium" on alternative work other than prostitution, ω can be interpreted as the "effective wage" in the alternative labor market. Relatedly, the "effective wage ratio" ρ is a gender income ratio that accounts for the occupational hazard of prostitution (as a premium on alternative work). Finally, the "preference ratio" σ measures men's intrinsic valuation of s units of prostitution relative to one unit of marriage.

The following parametric assumption ensures positive prices and allows us to focus on equilibria in which there is activity in both markets:

Assumption 1. $\sigma > 1$ *and* $\rho \in [\frac{1}{\sigma-1}, \frac{\sigma}{\sigma-1}]$.

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[18]Specifying intrinsic female preferences over mating and prostitution would allow parameter constellations for which women buy sex from men in one or both markets. As is, the model restricts attention to the case where men buy sex from women, and it only remains to specify the parameters for which both markets exist (Assumption 1 below). This "gender-biased" modeling choice simplifies the analysis.

[19]Modeling these as mutually *exclusive* options is a simplification, and not to be taken literally. All we need is that prostitutes face some form of "discount" in the alternative markets, such as lower "prices" (e.g., lower wage or worse treatment by spouse) or lower "quality" (e.g., fewer working hours or worse pool of potential spouses). This qualification is important in light of evidence that prostitutes are not necessarily less likely to be legally married (Arunachalam and Shah, 2008) and may simultaneously hold other jobs (Cunningham and Kendall, 2014). An article on Nevada's *legal* brothels illustrates how prostitutes are socially stigmatized in a manner that, by any reasoning, excludes them from parts of the "outside" labor and mating markets (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.

Note also that we will use the terms "mating" and "marriage" interchangeably throughout the paper since monogamous relationships need not imply marriage or may graduate through various stages (Persson, 2014), and that the idea that working as a prostitute may come with costs for (the quality of) monogamous mating can be equally applied to male or gay prostitution.

[20]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.

The constraint on σ ensures that men's demand for prostitution is positive in equilibrium, while the constraint on ρ ensures that some but not all women choose to supply prostitution in equilibrium.

An equilibrium of this model is a vector (p_m, p_s, n) that satisfies the following conditions:

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\begin{align}
sp_s - h &= p_m + w \tag{1} \\
\frac{p_s}{e} &= \frac{p_m}{k} \tag{2} \\
nsp_s &= (1-n)(y - p_m) + ny \tag{3}
\end{align}
$$

(1) says that women must be indifferent between prostitution and the alternative markets. Similarly, (2) says that for men both types of sex must have the same "per-util" price. Last, the market clearing condition (3) says that all male income not spent on marriage must be spent on prostitution.

The two indifference conditions (1) and (2) yield unique marriage and prostitution prices, denoted by p_m^* and p_s^*, respectively. Given the prices, the market clearing condition (3) pins down a unique level of prostitution, denoted by n^*.

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

We refer to the outcome described by Proposition 1 as the "free" equilibrium because it obtains in the absence of coercion and legal constraints. It will serve as a positive benchmark to which we compare outcomes with sex trafficking, and as a normative benchmark by which we evaluate the effectiveness of different prostitution laws.

The level of prostitution in the free equilibrium depends only on σ and ρ. A decrease in σ reflects a shift in men's intrinsic preferences towards marriage. For a fixed effective wage ratio ρ, this reduces their demand for prostitution. To understand the effect of ρ, note first that, by Assumption 1, men value the consumption of s units of non-reproductive sex more than marriage to one woman. This is a necessary condition for the demand for prostitution in our model to be non-zero. It further implies through the indifference conditions (1) and (2) a premium on prostitution relative to marriage, $\frac{sp_s^*}{p_m^*} = \sigma > 1$, independent of y and ω. When male income y increases, more of that increase hence flows to prostitution than to marriage. So, intuitively, the ratio $\rho \equiv \frac{y}{\omega}$ gauges how much income prostitution offers women (which is increasing in y) relative to the effective wage in the alternative labor market (ω). Even for a fixed preference ratio σ, raising ρ thus increases the level of prostitution.[21]

The determinants of voluntary prostitution can be summarized as follows:

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[21]The effect of y can be different if men's intrinsic valuation of marriage changes with income. For example, Edlund and Korn (2002) consider a model extension where men care about child quality, and child quality increases with the income pooled in marriage. In this setting, voluntary prostitution can decrease with male

Corollary 1. *Voluntary prostitution (a) decreases with women's effective wage ω but (b) increases with men's preference ratio σ and wage y.*

The comparative statics in (a) work through the supply side: a rise in h or w increases the (opportunity) costs of working as a prostitute, and hence reduces the supply of prostitution. The comparative statics in (b) operate through the demand side: a change in male income y or preference for prostitution σ affects the demand for prostitution. Note that female and male wages have opposite effects on voluntary prostitution. In particular, keeping average income constant, voluntary prostitution increases with the gender income ratio $\frac{y}{w}$.

Last, the effects of h (through ω) and k (through σ) capture the two main explanations proposed in the existing literature for the wage "premium" earned by prostitutes, namely as a compensating differential for occupational hazards and for forgone (or depreciated) mating opportunities. Indeed, the premium in our model is $sp_s^* - w = p_m^* + h$, which increases in both h and k.

2.2 Sex trafficking

The United Nations (2000) defines trafficking 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 always involve transportation across borders.[22] Our analysis focuses on domestic trafficking, but cross-border issues are discussed in Section 5.3.

Trafficking is a costly activity. We assume that the cost $c(n_t)$ *per trafficked woman* is a function of the total number of trafficking victims n_t with the following properties:

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

$c'(\cdot) > 0$ implies that trafficking exhibits decreasing returns to scale. This ensures that the equilibrium value of n_t is a smooth function of all parameters.[23] One possible justification for $c'(\cdot) > 0$ is that, as n_t increases, competition and scale make it more difficult for (each of) the traffickers to find and appropriate victims or conceal their activity from law enforcement. The boundary assumptions $c(0) = 0$ and $c(1) > y$ rule out that all or no women are trafficked.

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income. We abstract from this aspect since we focus on sex trafficking which, as we will show, unambiguously increases with male income. Indeed, the predictions of our model on sex trafficking would be stronger if a rise in male income were to reduce voluntary prostitution.

[22]In the United States, most trafficking victims are domestic. Commonly cited estimates suggest 100,000-300,000 children are at risk of being trafficked in the United States every year (Estes and Weiner, 2001). The *Village Voice* has contested these estimates, suggesting instead numbers 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 accused of enabling the prostitution of underage girls (see, e.g., Kristof 2012a, 2012b).

[23]With non-decreasing returns to scale, the direction of the impact of the various policies analyzed further below would remain the same, with the difference that trafficking would respond in a "bang-bang" fashion, discontinuously switching between inexistence and maximum scale.

Trafficked prostitutes sell sex at the same competitive price as voluntary ones, but their revenues are extorted by the traffickers. Assuming free entry into trafficking, we impose that traffickers make zero profit in equilibrium:

$$sp_s = c(n_t). \tag{4}$$

Total prostitution n is now the sum of trafficked prostitution n_t and voluntary prostitution n_v. There will be two cases to consider in this setting: $n_t < n$ and $n_t = n$. In the first case, trafficking and voluntary prostitution coexist. In the second case, all women strictly prefer the alternative labor market to prostitution (rather than being indifferent), so the demand for prostitution is met exclusively by trafficking. We will describe the two cases in turn.

In the case of coexistence, the equilibrium is characterized by the indifference and market clearing conditions (1)-(3) and the traffickers' zero profit condition (4). Recall from Section 2.1 that (1)-(3) together uniquely pin down prices at p_s^* and p_m^*, and total prostitution at n^*. It only remains to decompose total prostitution into the two types. Using p_s^* in (4),

$$\frac{\omega}{1 - 1/\sigma} = c\left(n_t\right), \tag{5}$$

yields a unique solution $n_t > 0$. If this solution is smaller than n^*, we have indeed coexistence with $n_v = n^* - n_s$.

By contrast, if said solution exceeds n^*, the women's indifference condition (1) must be replaced by $sp_s - h \le p_m + w$. (2) and (3) then pin down prices for prostitution and marriage as a function of $n = n_t$:

$$p_s = \frac{y\sigma}{s(n\sigma + 1 - n)} \qquad \text{and} \qquad p_m = \frac{y}{n\sigma + 1 - n}.$$

Substituting the expression for p_s into (4),

$$\frac{y\sigma}{n\sigma + 1 - n} = c(n), \tag{6}$$

yields a unique solution for n, all of which is trafficking in this case.[24] We summarize these findings in the next proposition.

Proposition 2 (Decriminalized prostitution)**.** *In the absence of prostitution laws, trafficking seizes a non-zero share of the prostitution market by displacing voluntary prostitution. When trafficking fully supplants voluntary prostitution, it increases total prostitution and decreases*

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[24]To see that the equilibrium solutions of the two cases connect smoothly, note that the solutions to (5) and (6) are identical if and only if $\frac{y\sigma}{n_t\sigma + (1-n_t)} = \frac{w}{1-1/\sigma}$. This, when solved for n_t, is equivalent to $n_t = n^*$. That is, the two solutions coincide once, and do so exactly at the point where trafficking completely displaces voluntary prostitution.

the price of both prostitution and marriage.

The reason trafficking constitutes a non-zero share of the prostitution market is *intrinsic* to coercion: Traffickers internalize neither occupational hazards nor opportunity costs borne by their victims. This represents a "cost advantage" relative to voluntary prostitutes, which offsets the costs of trafficking (up to some scale) and thereby enables traffickers to seize part of the market even if the marginal entrant, who pins down the price, is voluntary. Further, if trafficking is sufficiently cheap, it seizes the entire market by driving the price of prostitution below the cost of voluntary prostitutes. This in turn puts downward pressure on the price of marriage because women move out of the prostitution market into the marriage market while men's demand shifts in the opposite direction. Thus, on top of harming their victims, traffickers may exert a negative externality on married women.

2.3 Contraction and substitution

Through the lens of our model, voluntary prostitutes and traffickers are essentially competing providers of the same good (non-reproductive sex) operating under inherently different cost structures. Factors that affect their cost structures differentially hence influence their relative prevalence.

A factor that affects both types of prostitution in the same direction is male income y. When the two types of prostitution coexist, a rise in y does not affect trafficking (see (5)) but increases voluntary prostitution (as n^* increases). Absent voluntary prostitution, trafficking increases with y (see (6)). Intuitively, the increase in demand is met by the "marginal" mode of supply in each case, but there is never change in *opposite* directions.

By contrast, consider a decrease in the preference ratio σ. Absent voluntary prostitution, this decreases trafficking because a higher male preference for marriage lowers the demand for prostitution (see (6)). Analogously, in the coexistence case, the overall prostitution level n^* drops together with demand – however, trafficking *increases* in this case (see (5)). The reason is that a change in σ affects not only demand but, through the price of marriage p_m^*, also one *opportunity cost of voluntary prostitutes* – yet *none of the costs borne by traffickers*. This raises the price p_s^* of prostitution (via the compensating differential $sp_s^* - w = p_m^* + h$) and hence makes trafficking more attractive.

Similar effects arise with changes in the effective wage ω. In the coexistence case, where the marginal prostitute is voluntary, a rise in ω decreases total prostitution n^* but increases trafficking (see (5)). Larger ω represent higher (opportunity) costs for voluntary prostitutes. In equilibrium, this is reflected in a higher prostitution price, which in turn spurs trafficking. Thus, unlike voluntary prostitution, trafficking increases in *both* male and female wages.[25]

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[25] This is consistent with the fact that North America and Western Europe are the main destination regions

The next corollary summarizes these comparative statics.

Corollary 2. *As long as voluntary prostitution exists, trafficking decreases with men's preference ratio σ and increases with women's effective wage ω, with total prostitution changing in the opposite direction. In the absence of voluntary prostitution, trafficking increases with men's preference ratio σ and wage y.*

Common to decreases in σ and increases in ω in the coexistence case is a *contraction* of the prostitution market as a whole but an *expansion* of trafficking, by way of a *substitution* of trafficking for voluntary prostitution. This is because they effectively represent an increase in the production costs of one particular subset of suppliers (of non-reproductive sex). This leads to, along with a market contraction, a rise in market prices that benefits other suppliers. This simple logic will be crucial to understanding the impact of prostitution laws.

Finally, notice that changes in women's effective wage ω are immaterial to the prostitution market when only trafficking exists. This is intuitive since any mechanism that operates through the *supply* of prostitution is irrelevant when the relevant supply channel is inactive. By contrast, determinants of the *demand* for prostitution, such as y and σ, affect the market as long as there is any supply. This will also be important for understanding the differential impact of laws depending on which side of the market is targeted.

Example. Suppose $c(n_t) = cn_t$. For the example, we set $c = 10$, $y = 1$, as well $e = k = 1$ and $s = 2$ so that $\sigma = 2$. We will vary the effective female wage ω. In the case of coexistence, the level of trafficking is $n_t = .2\omega$ and the total level of prostitution is $n^* = \frac{1}{\omega} - 1$. Otherwise, the levels of trafficking and total prostitution coincide at $n_t = -\frac{1}{2} + \frac{3}{\sqrt{20}}$. Figure 1 illustrates the composition of the prostitution market for a range of ω: As ω increases, total prostitution decreases, while voluntary prostitution recedes but trafficking scales up.

3 Criminalizing prostitution

The argument for laws against prostitution is simple: Making the sale or purchase of the final product (non-reproductive sex) more expensive or difficult reduces *any* supply thereof (such as trafficking). In this section we show why this argument may fail in the case of prostitution markets, focusing on laws against the *sale* of sex and the *purchase* of sex separately to isolate the effect of each measure. We refer to laws against the sale of sex as the "traditional" model

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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, the insight also holds in the extension with cross-border trafficking in Section 5.3: Trafficking in(to) a country increases in male and female domestic wages.
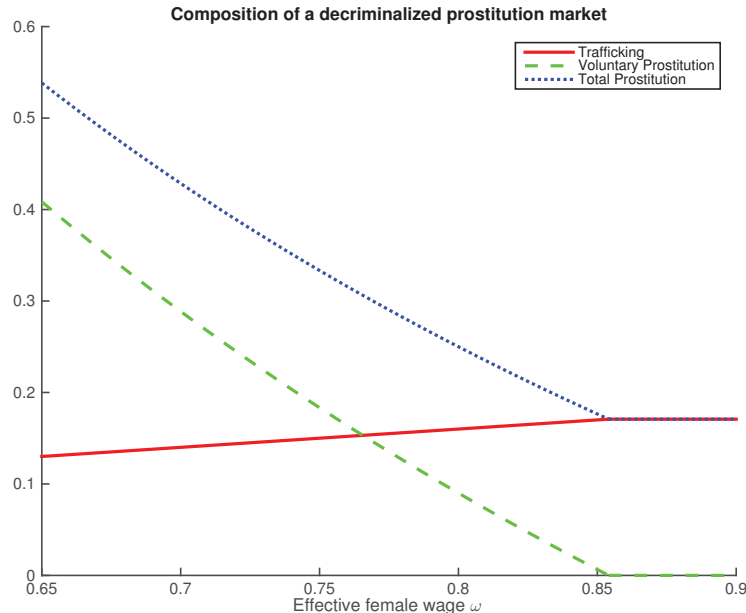
Figure 1: Contraction and substitution in a decriminalized prostitution market. As women's effective wage ω and hence the (opportunity) cost of prostitution increase, overall prostitution decreases, but there is also a shift from voluntary prostitution to trafficking.

because, before Sweden's prostitution law reform in 1999, johns were rarely prosecuted even in countries where the law on the books criminalized both sides of the market.[26]

3.1 Criminalizing prostitutes (Traditional model)

Assume the police is ordered to arrest prostitutes. Policing is 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 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 from prostitutes that are arrested.[27]

The law may also raise the "cost of doing business" as transactions are handled differently to escape law enforcement. Some incremental costs, denoted by l_1, are administrative (e.g.,

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[26]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).

[27]Empirically, the risk of conviction for traffickers seems negligible; not only is their risk of arrest small but their victims are often too afraid to testify against them. For example, although 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). This does not rule out that laws against prostitution increase the cost of avoiding arrest even for traffickers. This cost will be included in our analysis.

communication, payment, or location choice) and incurred by both traffickers and voluntary prostitutes. Others, denoted by l_2, are experiential (e.g., a less hygienic or unsafe work environment), borne only by those directly involved in the sexual exchange, such as prostitutes but not traffickers.[28]

In short, both voluntary prostitutes and traffickers face higher costs and expect some loss of income (from arrests). This affects the equilibrium conditions that characterize supply: The women's indifference condition (1) and the traffickers' zero-profit condition (4) must be modified to, respectively,

$$s(1-q)p_s - h - l_1 - l_2 - q\kappa_s = p_m + w \tag{7}$$

$$s(1-q)p_s = c(n_t) + l_1. \tag{8}$$

Conveniently, we can rewrite (7) as $s(1-q)p_s = p_m + w + h'$ where $h' \equiv h + l_1 + l_2 + q\kappa_s$ is a modified occupational hazard measure that reflects the increased costs of being a prostitute.

We first consider the case of coexistence. In this case, the equilibrium price of prostitution is pinned down by (7) and (2) as

$$p_s = \frac{\omega'}{s(1 - 1/\sigma')}.$$

The modified "effective wage" $\omega' \equiv \frac{w+h'}{1-q}$ reflects the impact of higher costs (h') and "taxes" $(1-q)$ on required compensation, while the modified "preference ratio" $\sigma' \equiv (1-q)\sigma$ captures that the partial "taxation" of revenues is furthermore akin to a shift in male preferences towards marriage. Consistent with intuition, the price of prostitution increases to compensate voluntary prostitutes for the burdens imposed by the law. By substituting (2) to rewrite (3) as $n = \frac{y}{sp_s}\frac{\sigma}{\sigma-1} - \frac{1}{\sigma-1}$, we see that this also implies a decrease in total prostitution. This is, however, not true for trafficking. Plugging the equilibrium value of p_s into (8) yields

$$\frac{\omega + l_2 + q\kappa_s}{1 - 1/\sigma'} + \frac{l_1}{\sigma' - 1} = c(n_t). \tag{9}$$

By inspection, the left-hand side is strictly larger here than in (5), implying a larger solution for n_t.

The reason trafficking increases is that the law, while making the sale of sex more difficult, affects the cost structures of voluntary prostitution and trafficking *differentially*. This is most evident in the case of l_2 and $q\kappa_s$, which are costs borne by voluntary prostitutes but not by

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[28]Using natural experiments, Cunningham and Shah (2014) and Nguyen (2015) provide the first evidence that criminalization has a positive *causal* effect on experiential occupational hazards of prostitution. More specifically, their findings suggest that it increases the number of gonorrhea cases and rape charges, both of which are strongly associated with (underground) prostitution.

traffickers. When the price p_s increases to compensate voluntary prostitutes for these costs, as in the case of coexistence, it *over*compensates traffickers. This explains why n_t increases with l_2 and $q\kappa_s$.

The intuition for why n_t also increases with l_1 and q (even if $q\kappa_s$ is held constant), both of which affect traffickers and voluntary prostitutes alike, is similar but involves a feedback effect through the marriage market: Any direct effect that raises p_s shifts male expenditure towards marriage. The price of marriage p_m hence increases via the men's indifference condition (2). However, this represents an increase in the *opportunity costs* of prostitution, which further increases the price of prostitution p_s through the women's indifference condition (7). Crucially, this additional price increase overcompensates traffickers, who do not internalize their victims' opportunity costs.[29]

Thus, while there are two channels – occupational hazards and mating opportunity costs – in either case the underlying mechanism is that the law changes not just the absolute costs of supplying prostitution (leading to contraction) but also the *comparative* cost advantages of traffickers relative to voluntary prostitutes (leading to substitution).

For brevity, we do not present here the formal analysis for the case where only trafficking exists. It is straightforward to show that, in the absence of voluntary prostitution, an increase in q or l_1 decreases trafficking, while changes in l_2 and κ_s have no effect on the market.

Proposition 3. (Traditional model)*Criminalizing the sale of sex decreases total prostitution but increases trafficking so long as voluntary prostitution exists. Raising the criminal penalty for prostitutes cannot eradicate prostitution in general and weakly increases trafficking.*

The takeaway is that the effect of criminalizing the sale of sex on trafficking is ambiguous. Whether trafficking increases or decreases hinges on the extent of voluntary prostitution. In the case of coexistence, the law pushes the market further away from the "free equilibrium" outcome of Proposition 1 by increasing trafficking at the expense of voluntary prostitution. Furthermore, criminal sentences for prostitutes can only benefit traffickers, all while harming both women that sell sex voluntarily and those that already suffer from being trafficked.

3.2 Criminalizing johns (Swedish model)

Because of the aforementioned disadvantages of laws against prostitutes, the Swedish model has gained popularity in recent years. The Swedish model was founded upon the recognition that the traditional model punishes the wrong persons, and moreover, that prosecuting johns

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[29]This effect – that a shift in men's demand between prostitution and marriage affects prostitutes' opportunity costs – is the central insight of Edlund and Korn (2002)'s model. That said, a qualitatively similar feedback effect would also arise in a model with social stigma if the stigma of prostitution decreases with the prevalence of prostitution, that is, when norms against prostitution are endogenous as in Giusta et al. (2009).

may have a stronger and more equal impact on all types of suppliers because it attacks the demand side.

So assume the police is ordered to arrest johns but spare prostitutes. Arrests occur after the sex transactions and any 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 proxies for the idea that the likelihood of being arrested increases with the frequency of purchases. Prostitutes keep their income, but the need for secrecy may again increase their cost of doing business, as denoted by l_1 and l_2. In addition, we now consider such incremental costs, denoted by l_3 (per unit of sex), also for johns.

Under these assumptions, the law changes the men's and women's indifference conditions and the traffickers' zero-profit condition to

$$sp_s - h - l_1 - l_2 = p_m + w \tag{10}$$

$$\frac{p_s}{e - q\kappa_b - l_3} = \frac{p_m}{k} \tag{11}$$

$$sp_s = c(n_t) + l_1 \tag{12}$$

By defining the modified parameters $h'' \equiv h + l_1 + l_2$, $\omega'' \equiv w + h''$, and $\sigma'' \equiv \frac{s(e - q\kappa_b - l_3)}{k}$, we can rewrite (10) and (11) as $sp_s = p_m + w''$ and $sp_s = \sigma'' p_m$, respectively. Thus, the virtual effects of the law are to raise the women's "effective wage" (through the occupational hazard of prostitution) and to lower the men's "preference ratio." As per our preceding discussions, each of these effects raises one component of the compensating differential, h and p_m, and thereby the premium on voluntary prostitution. Indeed, (10) and (11) yield

$$p_s = \frac{\omega''}{s(1 - 1/\sigma'')},$$

which is higher than p_s^* since $\omega'' > \omega$ and $\sigma'' < \sigma$. By plugging the equilibrium prices into (3) and (12), it is also straightforward to verify that overall prostitution decreases whereas trafficking increases to a level determined by

$$\frac{w + h + l_2}{1 - 1/\sigma''} + \frac{l_1}{\sigma'' - 1} = c(n_t).$$

As before, the effects are best understood in terms of the compensating differential. The price adjustment for l_2 overcompensates traffickers for occupational hazards borne by their victims. Furthermore, the price adjustment for l_1 and σ'' overcompensates traffickers because it partly reflects (that the shift in male demand has) increased mating opportunity costs of voluntary prostitutes, which traffickers do not internalize either. As a result of these effects, the market contraction goes together with supplier substitution.

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In the absence of voluntary prostitution, (11) and (3) yield a solution for p_s as a function of $n = n_t$. Plugging this solution into (12) yields

$$\frac{y\sigma''}{n\sigma'' + 1 - n} - l_1 = c(n).$$

The left-hand side is smaller here than in (6) for all n, implying a smaller solution for n. In other words, the (marginal) impact of the law on trafficking is negative when there is no (more) voluntary prostitution. In fact, a sufficiently large κ_b can render σ'' negative, thereby eliminating all prostitution, including trafficking.

Proposition 4. (Swedish model)*Criminalizing the purchase of sex decreases total prostitution but increases trafficking so long as voluntary prostitution exists. A high enough criminal penalty for johns eradicates prostitution in general and thus trafficking.*

On first thought, one would expect laws that target the demand for prostitution to affect all supply, whether voluntary or trafficked, equally. Our analysis shows that this is not the case if efforts to escape law enforcement aggravate the occupational hazards of prostitution, or if the shift in male expenditure out of the prostitution market makes the mating market more attractive. As in the traditional model, the key indicator is whether the law increases (or decreases) the premium on prostitution, i.e., the compensating differential to alternative work that women require in order to voluntarily work as prostitutes.

Still, the Swedish model is preferable to the traditional one. Punishing prostitutes has no deterrent effect on trafficking whatsoever; if anything, it increases trafficking. By contrast, sufficiently severe punishments for johns can eradicate trafficking, notwithstanding imperfect enforcement. This reflects a simple, important difference between supply and demand in the prostitution market. Part of the supply is based on *coercion*, and hence inelastic to penalties imposed on the coerced. All demand, on the other hand, is voluntary.[30]

Example. We revisit the example from before, but fix the effective female wage at $\omega = .6$. We will instead compare the traditional model and the Swedish model by varying the criminal penalty for prostitutes (κ_s) and for johns (κ_b) under the respective legal regimes, for a given arrest probability $q = .05$. For simplicity, we set all other incremental occupational hazards to $l_1 = l_2 = l_3 = 0$. Figure 2 shows how marginal increases in the criminal penalty affects the composition of the prostitution market under each regime.

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[30]Even criminalizing johns can fail 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 practicable penalty deters them from buying sex. Becker, Murphy, and Grossman (2006) show that criminalization can increase the resources spent on an illicit activity when demand is inelastic. The "demand inelasticity" assumption is also central to Akee et al. (2014)'s result that law enforcement can increase transnational trafficking. This is completely different from the effect in our model, where demand is elastic, that criminalization can backfire in the presence of "desirable" and "undesirable" supply.
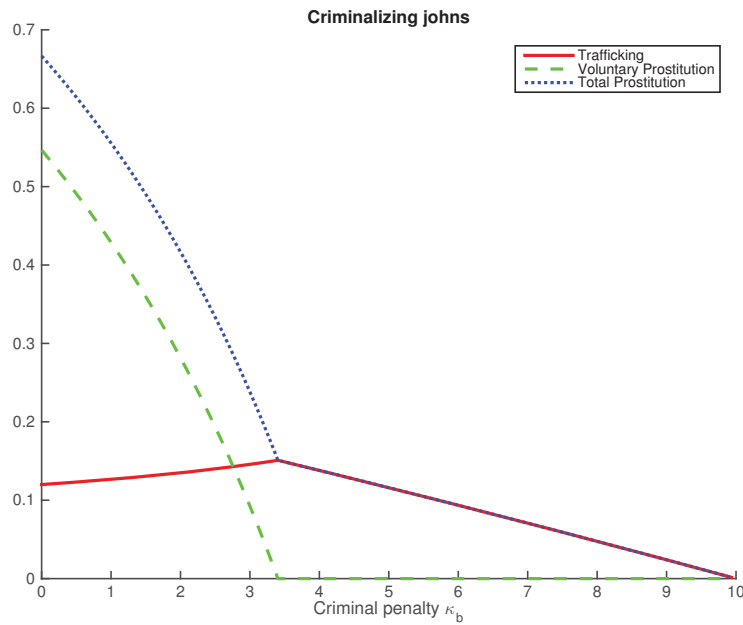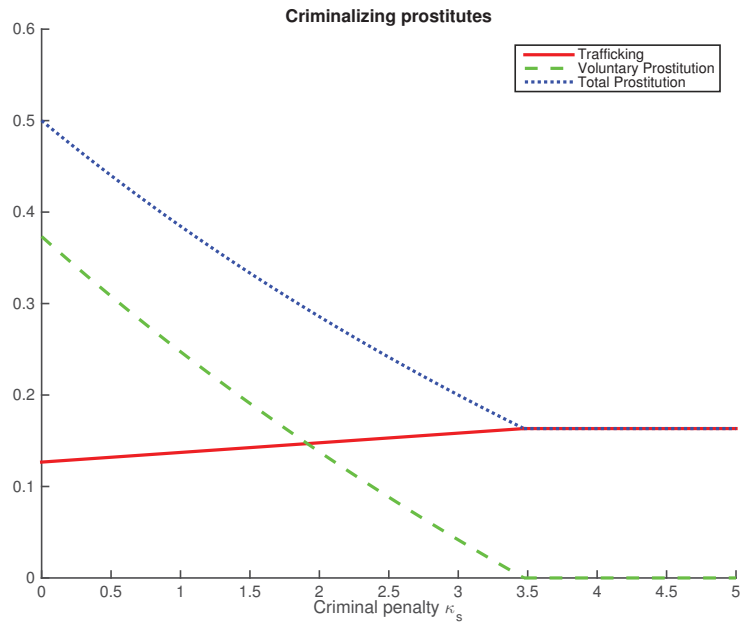
Figure 2: Sell-side or buy-side criminalization. Criminal penalties against prostitutes always (weakly) increase trafficking. By contrast, criminal penalties against johns (first increase but then) decrease trafficking once there is no voluntary prostitution.

4 Regulating prostitution

A number of countries, notably the Netherlands, have regulated prostitution markets. This approach imposes registration, licensing, or zoning requirements on prostitutes, but subject to these constraints, prostitution is legal. The aim is to create a safe working environment for prostitutes, free from coercion and the hazards of "underground" markets. The rules thus serve a "gatekeeping" or quality-control function, as in occupational licensing systems. In this section, we first compare the Dutch model to decriminalization, the traditional model, and the Swedish model. Afterwards, we propose a new regulatory approach.

4.1 Licensed prostitution (Dutch model)

Suppose it is legal to sell sex subject to a license. We assume that a voluntary prostitute can obtain a license at negligible cost but that a trafficking victim would not pass the licensing procedure. An unlicensed prostitute faces a probability $q < 1$ of being arrested. If arrested, she forfeits her income and bears a criminal penalty κ_s. Traffickers remain undetected but lose income when their prostitutes are arrested.

There are now two prostitution markets, licensed and unlicensed, with respective prices $p_{s,l}$ and $p_{s,u}$. For both markets to exist, men must be indifferent between the two markets, which requires uniform prices: $p_s = p_{s,l} = p_{s,u}$. Such prices in turn imply that a voluntary prostitute prefers to work in the licensed market, as her expected income from the unlicensed market, $(1-q)p_s$, would be lower due to the risk of arrest. Thus, in the case of coexistence, voluntary prostitutes and traffickers face identical prices but different arrest probabilities.[31]

Since voluntary prostitutes work legally, this policy does not increase their occupational hazards, and hence neither does the effective female wage ω in the alternative labor market. Similarly, since johns are not criminalized, the men's preference (ratio) does not shift towards marriage either. That is, neither the women's nor the men's indifference condition changes. However, the traffickers' zero-profit condition (4) changes to

$$(1-q)sp_s = c(n_t) + l_1. \tag{13}$$

In the coexistence case, prices and the total level of prostitution are therefore pinned down by (1)-(3) as p_s^*, p_m^*, and n^*, as in a decriminalized market, and thus unaffected by the law. However, as the solution of (13) is smaller than of (4), there is less trafficking, which in turn, since total prostitution is the same, implies more voluntary prostitution. Though, by (13), the criminal penalty κ_s has no effect on trafficking.

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[31]There is empirical evidence of supply shifts towards prostitution market *sectors* that are less subject to criminalization, such as from outdoor to (decriminalized) indoor prostitution (Cunningham and Shah, 2014), and from the illicit prostitution sector to the quasi-legal massage parlor sector (Nguyen, 2015).

Proposition 5. (Dutch model) *Licensing prostitutes and criminalizing unlicensed prostitutes decreases trafficking and increases voluntary prostitution. However, raising the criminal penalty for unlicensed prostitutes cannot eradicate trafficking.*

Key to the Dutch model is that, by providing voluntary prostitutes with a "safe harbor," it does not raise the compensating differential required by voluntary prostitutes. First, prostitution need not go "underground," which would directly raise the compensating differential for occupational hazards. Second, since there is neither a direct price effect nor a criminalization of johns that would shift male expenditure out of the prostitution market, there is no feedback effect that increases the compensating differential for mating opportunities either. In short, the Dutch model avoids price increases that overcompensate traffickers and thereby lead to a substitution of voluntary prostitution with trafficking.

On the contrary, the "gatekeeping" function of the licensing system keeps trafficked prostitutes out of the safe harbor, allowing law enforcement to home in on trafficking by targeting unlicensed prostitutes. This reduces profits and hence activity in the unlicensed market, and thereby *reverses* the displacement of voluntary prostitution by trafficking. Or put differently, the Dutch model pushes the market towards the benchmark "free equilibrium" outcome. This distinguishes it from the traditional model and the Swedish model, both of which push the market away from the free equilibrium in the case of coexistence.

Corollary 3. *As long as trafficking and voluntary prostitution coexist, the Dutch model leads to less trafficking and more voluntary prostitution than criminalization or decriminalization.*

The comparison in Corollary 3 does not cover parameter constellations under which the traditional or Swedish model eliminates voluntary prostitution (which cannot happen under the Dutch model unless voluntary prostitution is already inexistent under decriminalization). For identical q, the Dutch model dominates the traditional model even in such cases, as the price of prostitution is strictly lower (and hence trafficking less attractive) under the Dutch model. By contrast, the Swedish model can always be made more effective than the Dutch model against trafficking:

Corollary 4. *There exists a criminal penalty κ_b such that the Swedish model leads to strictly less trafficking than the Dutch model for any κ_s.*

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 with licensing requirements by penalizing unlicensed suppliers – which is how occupational licensing is usually enforced – is effective when supply is voluntary, but ineffective when such suppliers are coerced.[32]

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[32] Although prostitution outside of licensed brothels is illegal in Nevada, advertisements for sexual services

While the Swedish model can eradicate trafficking, this effectiveness comes at the expense of voluntary prostitutes. The Dutch model cannot be made as effective against trafficking but 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: whether to protect potential trafficking victims or the civil liberties of voluntary prostitutes (to pursue an occupation of choice in a safe environment). As discussed in the introduction, this tension is at the heart of the contemporary discourse on prostitution policy.

4.2 New proposal ("Dutch-Swedish" model)

So far, we have studied prostitution laws that exist in practice. In this section, we propose a new but related approach: licensing prostitutes and criminalizing the customers of unlicensed prostitutes. Suppose the government issues licenses to voluntary prostitutes and criminalizes the purchase of sex from unlicensed ones. A john who buys x units of sex from unlicensed prostitutes is arrested with probability q, and if so, bears a criminal penalty $x\kappa_b$. Unlicensed prostitutes are not prosecuted and can keep their income. As under the Swedish model, we assume that the need to avoid detection imposes additionals cost l_1, l_2, and l_3, but only on participants in the unlicensed market.

Under this law, men value licensed prostitution and unlicensed prostitution differently. Specifically, their valuation of *unlicensed* sex decreases to $e_u = e - q\kappa_b - l_3$, while their valuation of licensed sex remains $e_l = e$. For both markets to exist, men must be indifferent between them, which requires unlicensed sex to be offered at a discount: $p_{s,u} = p_{s,l} - q\kappa_b - l_3$. Due to this price wedge, voluntary prostitutes prefer the licensed market, where they also bear no additional costs. As under the Dutch model, voluntary prostitution and trafficking thus are, if coexistent, separated across the two markets and face different prices.

The equilibrium conditions under this law are

$$sp_{s,l} = p_m + w \tag{14}$$

$$\frac{p_{s,l}}{e}, \frac{p_{s,u}}{e_u} = \frac{p_m}{k} \tag{15}$$

$$(n - n_t)sp_{s,l} + n_t sp_{s,u} = (1 - n)(y - p_m) + ny \tag{16}$$

$$sp_{s,u} = c(n_t) + l_1 \tag{17}$$

where (14) is the women's indifference condition, (15) the men's indifference condition (across all three markets), (16) the market clearing condition that all male income not spent on marriage is spent on the two prostitution markets, and (17) the traffickers' zero-profit condition

occupy about 140 pages of the Yellow Pages in Las Vegas, a city without licensed prostitution. In 2009, the Federal Bureau of Investigation listed Las Vegas as one of the 14 U.S. cities with the highest rates of child prostitution (Whaley, 2010).

in the unlicensed market.

The indifference conditions (14)-(15) yield the unique equilibrium prices $p_{s,l} = p_s^*$, $p_m = p_m^*$, and $p_{s,u} = \frac{\sigma_u w}{s(\sigma-1)}$ where $\sigma_u \equiv \frac{se_u}{k}$ is the men's preference ratio with respect to unlicensed sex relative to marriage. Since voluntary prostitutes have access to the safe harbor, the prices of licensed sex and marriage are the same as in the decriminalized market, that is, unaffected by the law. One measure of the wedge between licensed and unlicensed prostitution prices is the price ratio $\frac{p_{s,l}}{p_{s,u}} = \sigma_u$, which equals the men's reduced preference ratio towards unlicensed sex.

Using the price of unlicensed prostitution $p_{s,u}$ in the traffickers' zero-profit condition (17) yields

$$\frac{\sigma_u}{\sigma} \frac{w}{1 - 1/\sigma} - l_1 = c(n_t). \tag{18}$$

A comparison to (5) shows that the law reduces trafficking (since $\sigma_u < \sigma$ and $l_1 \geq 0$). Last, plugging all prices into the market clearing condition yields

$$n = \rho - \frac{1}{\sigma - 1} + \frac{\sigma - \sigma_u}{\sigma - 1} n_t, \tag{19}$$

which shows that, as the law decreases n_t, it also decreases total prostitution. Furthermore, since the demand for unlicensed sex is positive only if $\sigma_u > 1$, it must be that $\frac{\sigma - \sigma_u}{\sigma - 1} < 1$ as long as the unlicensed market is active. Thus, (19) implies that total prostitution does not decrease as much as trafficking, which in turn implies that voluntary prostitution increases.

Proposition 6. (Dutch-Swedish model) *Licensing prostitutes and criminalizing johns that buy sex from unlicensed prostitutes decreases trafficking and increases voluntary prostitution.*

The proposed law "corrects" the market in the same direction as the Dutch model towards the free equilibrium. Like the Dutch model, it does so by creating a safe harbor for voluntary prostitutes to avoid raising the compensating differential in prostitution prices, which would promote trafficking, and targeting activity only in the unlicensed market. It has, however, a key advantage over the Dutch model: the effect of the criminal penalty κ_b. For $\kappa_b > \frac{e - l_3 - k/s}{q}$, we have $\sigma_u < 1$, in which case men's preference ratio towards unlicensed sex is so low that demand in the unlicensed market vanishes.

Corollary 5. *Licensing prostitutes and criminalizing johns that buy sex from unlicensed prostitutes restores the free equilibrium outcome for a sufficiently severe criminal penalty κ_b.*

The proposed law has a simple logic: 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 the criminal penalties on johns in the unlicensed market sufficiently severe then diverts all demand away

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, would eradicate trafficking even if some demand were 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.[33]

5 Extensions and empirical implications

In this section, we discuss predictions of our theory and some straightforward extensions that offer some guidance for empirical studies that aim to assess the impact of prostitution laws. In particular, we discuss issues related to the external validity of country-level impact studies (Sections 5.1 and 5.2) and to the comparative evaluation of domestic policies in the presence of equilibrium effects on cross-border flows (Section 5.3).

5.1 Heterogenous impact of (de)criminalization

As shown in Section 3, the criminalization of (selling or buying) prostitution can increase or decrease trafficking depending on the prevalence of voluntary prostitution: trafficking decreases only once voluntary prostitution has been fully eliminated, but increases otherwise. Recall also that, when both form of prostitution coexist, the level of voluntary prostitution equals

$$n_v = n^* - n_t$$

where n^* is the total level of prostitution as determined in Proposition 1, and n_t is the level of trafficking as determined by the zero-profit condition $sp_s^* = c(n_t)$. Thus, the likelihood that a criminalization policy decreases trafficking is greater for lower n^* and higher p_s^*.

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[33]One advantage of the hybrid model is that stipulating very severe criminal penalties may be consistent with the principle of proportional justice, whereby the punishment of a certain crime should be in proportion to the severity of the crime itself. As a point of comparison, note that under the Swedish model, johns may be punished for transactions that involve fully consenting individuals. Under the hybrid model, since voluntary supply shifts to the licensed sector in equilibrium, a john who buys sex from an unlicensed prostitute must rationally infer that the prostitute is coerced. He is thus, in a sense, complicit in trafficking, which is arguably a much more serious crime.
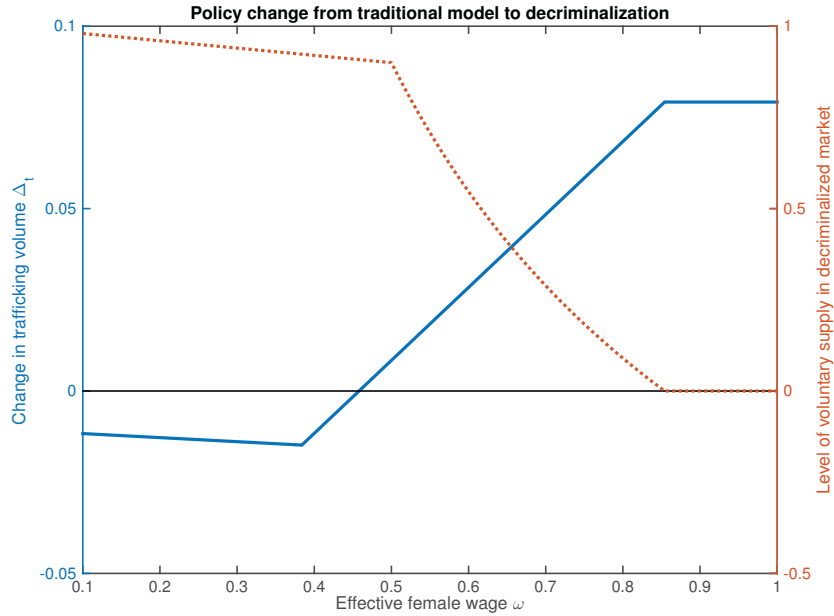
Figure 3: Ambiguous impact of decriminalization. A reform that decriminalizes prostitution decreases trafficking when the environment is conducive to voluntary prostitution, which in this example is the case when the effective female wage is low. Conversely, decriminalization increases trafficking when the incentives for voluntary prostitution are low.

By inspection of Proposition 1, notice that changes in n^* and p_s^* have a (weakly) inverse relationship in equilibrium: decreases in ρ lower n^* but do not affect p_s^*, whereas decreases in σ lower n^* but raise p_s^*. Criminalizing prostitution is therefore more likely to be a deterrent to trafficking in countries with lower ρ or σ.

Corollary 6. *Criminalizing prostitution is more likely to decrease trafficking where, all else equal, the gender income ratio y/w is lower and the occupational hazard h is higher, but more likely to increase trafficking where the opposite is the case.*

Of course, Corollary 6 also implies, inversely, that *de*criminalization has an ambiguous effect on trafficking, and that the direction of the impact crucially depends on y/w and h.[34]

Example. Using again the example from before, we now compute, for a range of ω, the impact that moving from a traditional model with $q = .05$ and $\kappa_s = 1$ to a decriminalized market has on trafficking. Let Δ_t denote the trafficking level in the decriminalized market

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[34]For a given n^*, the level of voluntary prostitution n_v decreases in the level of trafficking n_t. Thus, changes in the cost of trafficking also affect the impact of prostitution laws. This has a perhaps surprising implication: When law enforcement targeted *directly* at traffickers raises the cost of trafficking, criminalizing prostitution is more likely to promote trafficking. That is, the two law enforcement strategies have countervailing effects.

minus the trafficking level under the traditional model: $\Delta_t < 0$ means that the decriminalization decreases trafficking, whereas $\Delta_t > 0$ means the opposite. Figure 3 plots Δ_t against ω to illustrate that decriminalization can have either effect, depending on the size of ω which determines the (latent) level of voluntary prostitution (in the decriminalized market).

Corollary 6 suggests caution in drawing conclusions from the impact of a prostitution law reform in one setting about the potential impact of the reform elsewhere. For example, even if criminalization decreased trafficking in a country with low gender income inequality y/w (e.g., Sweden), the same law might promote trafficking in a country where this is not the case (e.g., South Korea). A law may also affect market segments differentially. For example, if one segment (e.g., street prostitutes) involves a larger occupational hazard h than another segment (e.g., high-end escorts), criminalization may decrease trafficking in one but increase it in the other.[35]

5.2 Endogeneity and impact of (de)criminalization

Country characteristics that affect the efficacy of prostitution laws may simultaneously affect the political support for them. Men in our model always prefer decriminalization because it lowers the price of (non-reproductive and reproductive) sex. The support among women, on the other hand, may depend on the conditions they face in the alternative labor market.

To illustrate this, consider first a country in which the effective wage ω is so high that $\rho < \frac{1}{\sigma-1}$ (in violation of Assumption 1) so that there is no voluntary prostitution. In this case, all women benefit from criminalizing prostitution because the decrease in consumption of prostitution (from trafficked prostitutes) would increase their rents in the mating market. By contrast, consider a simple model extension with a "thin" demand for female workers. Specifically, suppose woman i's effective wage in the alternative labor market is given by $\omega = \gamma i$ where $i \in [0,1]$.

In a decriminalized market, the price of prostitution p_s is pinned down by (1)-(3) except that γn replaces ω in (1). Solving these equations for sp_s yields a quadratic equation with a unique positive solution for the equilibrium income of a prostitute:

$$sp_s = \frac{\gamma\sigma}{\sigma-1}\left[-\frac{1}{2(\sigma-1)} + \sqrt{\frac{1}{4(\sigma-1)^2} + \frac{y}{\gamma}}\right]. \tag{20}$$

Now suppose this country would criminalize johns so severely that prostitution is eliminated.

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[35]Countries may also differ in norms against prostitution. Social stigma can be incorporated in our model as a higher occupational hazard h (for prostitutes) or a lower preference e for prostitution (for johns). Laws may also affect such norms through their "expressive function" (Kotsadam and Jakobsson, 2011). The impact of a law may hence vary across countries with different social norms, and may be reinforced through a "norms channel."

This improves voluntary prostitute j's income only when $y + \omega_j \geq sp_s$. All prostitutes for whom this inequality is violated oppose the criminalization because their options outside of prostitution are too unattractive. If we choose $y = 1$ and $\sigma = 2$, as in our previous examples, and furthermore $\gamma = 1$, this is the case for all prostitutes with $j \lesssim .24$.

South Korea offers an interesting anecdote. In 2004, it adopted the Swedish model and significantly increased law enforcement and criminal penalties for johns. 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.

Such protests have since been recurrent in South Korea (e.g., AP News 2011). Incidentally, South Korea has a very high male-female income gap. This stands in contrast to the other countries that have adopted the Swedish model – Sweden, Norway, and Iceland – which have the smallest male-female income ratios in the world (OECD, 2009, Table 2), and have hardly seen any public demonstrations against the law.

Our analysis suggests that the political support against prostitution and the effectiveness of criminalization are positively correlated, as both increase with parameters that reduce the magnitude of voluntary prostitution. This is pertinent to the external validity of impact studies because it implies that (de)criminalization policies are likely to be effective in those countries that adopt them, but likely to backfire precisely in those that have not done so.

5.3 Cross-border effects

Our main analysis focused on the impact of prostitution laws on a single "closed" economy. In practice, such laws may also affect the demand and supply of prostitution in other countries. One possible channel for such cross-border effects is sex tourism. We illustrate this through a simple extension in which two countries, A and B, are each described by our basic model. The wages y and w, men's intrinsic preferences k and e, and the occupational hazard h are the same in both 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. In the benchmark setting, prostitution and trafficking coexist, though the sale of prostitution is criminalized in both countries (to the same degree). We then ask what happens if one of the countries decriminalizes prostitution.

Given the countries are identical, we consider a *symmetric* equilibrium in the benchmark setting, for which we can apply the coexistence solution derived in Section 3.1 (traditional

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model): The prices of prostitution are

$$p_{s,A}, p_{s,B} = \frac{\omega'}{s(1 - 1/\sigma')},$$

and the prices of marriage are (hence by (7))

$$p_{m,A}, p_{m,B} = \frac{w + h'}{\sigma' - 1}$$

with h', ω', and σ' defined as in Section 3.1. Further, the country levels of prostitution are

$$n_A, n_B = \frac{y}{sp_s} \frac{\sigma}{\sigma - 1} - \frac{1}{\sigma - 1},$$

while the level of trafficking in each country is $n_t'/2$, where

$$\frac{\omega + l_2 + q\kappa_s}{1 - 1/\sigma'} + \frac{l_1}{\sigma' - 1} = c(n_t'). \tag{21}$$

Now suppose country A decriminalizes prostitution. As a result, the women and men of country A face the indifference conditions (1) and (2) from Section 2.1 (decriminalization) with respect to *domestic* prices. These conditions yield a new domestic price $p_{s,A}^* = \frac{\omega}{s(1-1/\sigma)}$, which is smaller than $p_{s,A}$ since $\omega < \omega'$ and $\sigma > \sigma'$.

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 prostitution market only if in addition to men in country B weakly preferring domestic prostitution to marriage,

$$sp_{s,B} \le \sigma p_{m,B}, \tag{22}$$

the price of domestic prostitution is competitive,

$$p_{s,B} \le p_{s,A}^*. \tag{23}$$

At the same time, there is voluntary supply in country B's prostitution market only if women in country B weakly prefer prostitution to marriage,

$$(1 - q)sp_{s,B} \ge p_{m,B} + w + h'. \tag{24}$$

Thus the prostitution market in country B is active only if (22)-(24) hold simultaneously. As it turns out, this cannot be achieved.[36] Intuitively, for women in country B to be willing

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[36](22) and (24) jointly define a set of $p_{s,B}$. This set is non-empty only if $p_{m,B} \ge \frac{w+h'}{(1-q)\sigma - 1}$. (23) and

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to sell prostitution so cheaply that they can compete with country A's prostitution market, the price of marriage in country B must fall. But before the price reaches a level at which women in country B would enter prostitution, it reaches a level at which the men in country B prefer to marry domestic women and buy prostitution abroad.

In an equilibrium where there is no prostitution in country B, the following conditions must hold: The women in country B must weakly prefer marriage to prostitution,

$$(1-q)sp_{s,B} \leq p_{m,B} + w + h', \tag{25}$$

and the men in country B must weakly prefer marriage to spending more on prostitution in country A,

$$\frac{p_{s,A}^*}{e} \geq \frac{p_{m,B}}{k}. \tag{26}$$

These two conditions can be jointly satisfied.[37] To pin down the price of marriage in country B, we let men spend the minimum on marriage to maximize their consumption of sex. This means setting the price of prostitution in country B to the lowest level that is compatible with all demand for prostitution flowing to country A, $p_{s,B} = p_{s,A}^*$, and choosing $p_{m,B}$ such that the indifference condition (25) for the women in country B binds. This yields

$$p_{m,B} = \max \left\{ (1-q)\frac{\omega}{1 - 1/\sigma} - w - h', 0 \right\}.$$

In this equilibrium, the entire prostitution market is absorbed by country A, and men from country B become sex tourists. Even if autarkic, country A's prostitution market would grow after the decriminalization. Sex tourism from country B reinforces that growth. Traffickers send their victims to country A with the total level of trafficking now given by $sp_{s,A}^* = c(n_t)$, or

$$\frac{w}{1 - 1/\sigma} = c(n_t). \tag{27}$$

A comparison of (27) with (21) shows that total trafficking decreases after decriminalization.

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(24) also define such a set, which is non-empty only if $p_{m,B} \leq \frac{(1-q)\omega}{1-1/\sigma} - w - h'$. These two conditions, in turn, are compatible only if $\frac{w+h'}{(1-q)\sigma-1} \leq \frac{(1-q)\omega}{1-1/\sigma} - w - h'$. Note that, if the last inequality is violated for $h' = h$, it is *a fortiori* violated for $h' > h$. For $h' = h$ (in which case $w + h' = \omega$), the inequality would be $\frac{\omega}{(1-q)\sigma-1} \leq \frac{(1-q)\omega}{1-1/\sigma} - \omega$. This can be rearranged to $(1-q)\sigma \geq \sigma$, which is false. (In deriving this contradiction, recall that $\sigma' \equiv (1-q)\sigma$ must be larger than 1 for voluntary prostitution to exist under the traditional model, i.e., for coexistence in our benchmark setting.)

[37] Rewrite (25) as $p_{m,B} \geq (1-q)sp_{s,B} - w - h'$, and (26) as $p_{m,B} \leq \frac{\omega}{\sigma-1}$ after substituting for $p_{s,A}^*$. These inequalities can hold simultaneously only if $(1-q)sp_{s,B} - w - h' \leq \frac{\omega}{\sigma-1}$. This holds, for example, for $p_{s,B} = p_{s,A}^*$ in which case the inequality becomes $(1-q)\sigma\frac{\omega}{\sigma-1} - w - h' \leq \frac{\omega}{\sigma-1}$. If this holds for $h' = h$, it holds a fortiori for $h' > h$. For $h' = h$, the inequality reduces to $q \geq 0$, which is true.

(This is the same comparison as between (9) and (5).)[38] But it need not fall below $n'_t/2$.[39] Thus, while the decriminalization reduces the total level of trafficking across both countries, it may raise trafficking in country A. Indeed, there is more trafficking in country A than in country B, although it is country A's policy, not country B's, that reduces overall trafficking. Where present, such cross-border "general equilibrium" effects warrant (i) studying also the impact on neighboring countries when evaluating a prostitution law reform and (ii) caution when drawing causal links from cross-country differences in national trafficking levels to the effectiveness of the countries' respective prostitution policies against trafficking.[40]

There is suggestive evidence of cross-border effects from a Swedish Government (2010) report on changes in the prostitution market following its adoption of the Swedish model in 1999:

> [T]he 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. (p. 7)

The report also reviews two surveys of Swedish men documenting "that it was more common to buy sex abroad than in Sweden" (p. 32) and quotes a study according to which the number of Nigerian prostitutes in Norway increased "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). Conversely, Gothenburg, a Swedish city close to Norway, saw a large increase in Nigerian prostitutes after 2009, when sex purchases were criminalized *also* in Norway (p. 20). Last, the report notes that the number of *foreign* prostitutes in the Scandinavian region increased after the Swedish law was passed.

6. Concluding remarks

We have modeled a semi-coerced market for sex with voluntary prostitution and trafficking to study the impact of prostitution laws on trafficking. The key mechanisms driving our results depend on cost differences between voluntary and coerced supply that arise from the coercive

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[38]Recall that this result obtains because we assume that there is voluntary prostitution. If there is initially no voluntary prostitution, decriminalization can increase trafficking.

[39]Whether that is the case depends on the parameters and the shape of $c(\cdot)$.

[40]By the way, it is straightforward to extrapolate the above insight to see that our model offers an alternative explanation for why transnational trafficking flows may increase with (the degree of) criminalization in both source and destination countries, as in Akee et al. (2014). Our explanation does not rely on demand being sufficiently inelastic but instead on some supply being voluntary.

labor relationship between traffickers and their victims: Traffickers do not internalize all the "participation" costs of their victims, such as opportunity costs and experiential hazards of prostitution. However, prices in a semi-coerced prostitution market may reflect those costs. Indeed, compensating differentials for such costs are the leading explanation in the existing literature for the relatively high price of prostitution.

We show that a decriminalized prostitution market in general accommodates a non-zero level of trafficking, but also that criminalizing the sale or purchase of sex does not necessarily reduce trafficking. On the contrary, criminalization increases trafficking at the expense of voluntary prostitution, and therefore reduces trafficking only once all voluntary prostitution has left the market. The net impact that a specific law has on trafficking therefore depends on the (latent) prevalence of voluntary prostitution, which in turn depends on demand factors, gender income differences, and the severity of the occupational hazards of prostitution. This context-dependence suggests caution in extrapolating findings from one country to the situations in others.

Despite this ambiguity, we rank prostitution policies that are currently in use in terms of their (potential) effectiveness against trafficking as well as their impact on voluntary prostitutes. On one side, the Swedish model (criminalizing johns) dominates the traditional model (criminalizing prostitutes). On the other side, the Dutch model (licensed prostitution) dominates decriminalization. Choosing between the Swedish and Dutch models, however, casts the prevention of trafficking against the civil liberties of voluntary prostitutes. Finally, we show that a hybrid Dutch-Swedish policy – licensing prostitution and criminalizing the *purchase* of unlicensed sex – resolves this tension. It thus dominates all existing legal approaches in our framework, while facing the same enforcement constraints as the two existing policies that it is a combination of.

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 to eliminate coercive organ trafficking while allowing for voluntary organ donations.

Our analysis represents only one of various perspectives that can be taken on the question of prostitution regulation. In particular, an important element of our analysis is that it views voluntary supply as socially desirable. Not surprisingly, in practice, this view is challenged by many. As far as we can tell, such challenges come in three variations: First, do voluntary prostitutes really have a "choice" if poor economic circumstances drive them to sell sex? This criticism is closely related to the view that *all and any* prostitution manifests exploitation based on gender biases and inequalities in society (Waltmann, 2011), a view that can be cast in terms of the hypothesis that voluntary prostitution would not exist if society were "fair and

equal." To what extent this hypothesis is true and whether the right policy instrument to address the implicated social issues is prostitution law are relevant questions for a normative debate on prostitution, but beyond the scope of the analysis in this paper.

Second, do voluntary prostitutes choose what is "best" for themselves? This question assumes that individuals may not always be capable of making "responsible" decisions, i.e., acting in their own interest. This opens the door to paternalistic restrictions on freedom of choice (as for minors before they reach the age of discretion). From this perspective, the two sides of the debate will interpret prostitution laws as either protecting individuals from poor decisions or as violating civil liberties. This tension between libertarianism and paternalism is often central in controversies on "moral" issues (Persson and Loginova, 2012).

Last, does violence and coercion not exist *inside* the market for sex, regardless of whether prostitutes enter the profession voluntarily? Our analysis in this paper indeed ignores that trafficking is not the only form of violence in prostitution markets. However, in a companion paper (Lee and Persson, forthcoming), we analyze other forms and sources of violence against prostitutes, and how their implications for prostitution law relate to those in this paper.

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