

# A Theory of Prostitution

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## Abstract

Prostitution is a profession that is low-skill, labor intensive, female, and well paid. This paper proposes the following explanation. A woman can be either wife or prostitute, but not both. If marriage is a source of income for women, then the prostitute has to be compensated for foregone marriage market opportunities. Hence, prostitution must be better remunerated than other low-skill occupations. Furthermore, we discuss the link between income and prostitution, and show that prostitution may decrease not only in female income but also in male income, suggesting one reason why prostitution has seen a secular decline in developed countries. We point to the role of male sex ratios, and males in transit, in sustaining high levels of prostitution, and discuss possible reasons for its low reputation. Finally, we argue that recognition of prostitution as a female strategy may add to the understanding of the evolution of marriage patterns.

Key words: Prostitution; marriage.

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## List of Variables

$c$	Consumption
$d(y; p)$	Individual demand for commercial sex, unmarried men
$\bar{d}(y, p_m^*; p)$	Individual demand for commercial sex, married men
$D(y, p_m^*; p, n)$	Aggregate demand for commercial sex
$i$	Rank index
$k$	Child quality
$m$	Marriage
$n$	Number of prostitutes
$N$	Number of people of either sex
$p_m$	Price of a marriage
$p$	Price of commercial sex
$s$	Commercial sex
$S(n)$	Aggregate supply of commercial sex
$t$	Tax on prostitution
$u$	Male utility
$v$	Female utility
$w$	Female labor market income (outside prostitution)
$y$	Male income
.*	Indicates equilibrium
$\alpha, \beta$	Utility parameters
$\gamma$	Income share mothers spend on child quality
$\lambda$	Ratio of commercial sex demanded by married men to unmarried men
$\Phi(p_m, y)$	Difference in utility between married and unmarried men

I wander thro' each charter'd street,  
Near where the charter'd Thames does flow,  
And mark in every face I meet  
Marks of weakness, marks of woe.  
...  
But most thro' midnight streets I hear  
How the youthful Harlot's curse  
Blasts the new born Infant's tear,  
And blights with plagues the Marriage Hearse.

(William Blake, "London", *Songs of Experience*, 1794)

## 1 Introduction

Prostitution is a multi-billion dollar business that employs millions of women world wide. A recent ILO study estimated that in Indonesia, Malaysia, the Philippines and Thailand, between 0.25 and 1.5 percent of the female population work as prostitutes and that the sex sector accounts for between 2 to 14 percent of the gross domestic product (Lim [33]). Prostitution is more common in less developed countries, but far from absent in developed ones (e.g. Philipson and Posner [42]; Atchinson, Fraser and Lowman [1]). The 1992 National Health and Social Life Survey (NHSLs) found that about 2 percent of American women had ever sold sex (Laumann [31]). A government estimate put the number of prostitutes in Germany at 150,000 (Morell [34]) and Amsterdam is believed to have about 25,000 prostitutes (Financial Times, 27 October 1999).

Prostitution has an unusual feature: it is well paid despite being low-skill, labor intensive and, one might add, female dominated. Earnings even in the worst paid type, streetwalking, may be several multiples of full time earnings in professions with comparable skill requirements. For instance, newspaper reports of earnings for prostitutes in Sweden in 1998 were as high as SEK 14,000 (USD 1,750) a day (Aftonbladet 25 September 1998), amounting to about a month's earnings in a regular unskilled job. The Economist [14] reported that Arabic women could make USD 2,000 a night in the Gulf states, and in the same article, a Latvian prostitute claimed she averaged USD 5,000 per month, 20 times the average wage. How can equilibrium earnings in a profession with only rudimentary skill and capital requirements be such that a woman can make in a day what for most women takes weeks or months?

The key to this puzzle may lie in the following observation: a woman cannot be both a prostitute and a wife. Combine this with the fact that marriage can be an important source of income for women, and it follows that prostitution must pay better than other jobs to compensate for the opportunity cost of foregone marriage market earnings.

Furthermore, if a man's willingness to support a wife exceeds his willingness to pay for a prostitute and if the supply of women in an endogamous group is

largely fixed, we may understand two other stylized facts about prostitution: why prostitutes are promiscuous; and why prostitution is prevalent wherever large numbers of men congregate temporarily. Moreover, prostitution has seen a secular decline in developed countries and we propose that this may be linked not only to higher female but also to higher male incomes. Prostitution has a poor reputation, and although tangential to the focus of this paper, the presence of social stigma is consistent with the proposed mechanism. Finally, we argue that recognition of prostitution as an alternative female strategy may shed light on the evolution of marriage patterns, in particular why polygyny and polyandry do not co-exist.

Before proceeding, we need to define prostitution. Despite being known as the oldest profession, a workable definition has proven elusive. From a dictionary we learn that prostitution is the “act or practice of engaging in sexual intercourse for money”.<sup>1</sup> But a prostitute cannot simply be a woman who sells her body, since “that is done every day by women who become wives in order to gain a home and a livelihood” (Ellis [17], :225; for concurring opinions see e.g. Engels [18]; and Russell [47]). Promiscuity has been proposed as another candidate. Medieval canon lawyer Johannes Teutonicus suggested that a woman who had sex with more than 23,000 men should be classified as a prostitute, although 40 to 60 would also do (Bullough and Bullough [6]:xi). However, promiscuity itself does not turn a woman into a prostitute. Although a vast majority of prostitutes are promiscuous, most people would agree that sleeping around does not amount to prostitution.<sup>2</sup> Moreover, any threshold number of sexual partners, be it 40 or 23,000, fails to identify high end courtesans or call girls as prostitutes, although a reasonable definition would.

Instead, we argue that prostitution is the act of rendering, from *the client’s* point of view, non-reproductive sex against payment.<sup>3</sup> This definition is consistent with the legal notion of marriage: a contract linking husband to children borne by the wife. For instance, Posner ([43] :244) notes that temporary marriages (as short as one hour) allowed to Shiite Muslims, are real marriages since the offspring is legitimate in the sense that paternity accrues to the husband. Hence, marriage is not prostitution, irrespective of duration, the number of men and women thus united, or money exchanged. Our definition of prostitution classifies courtesans and other high end forms of prostitution as just that, since sex with a courtesan is non-reproductive from the man’s point of view. Would a courtesan bear a child, there is no automatic link between the father

<sup>1</sup>The Random House Dictionary of the English Language, New York 1969.

<sup>2</sup>For instance, for the US in the early 1990s, about a quarter of women born between 1953-62 had had five or more (sexual) partners at age 30 (Laumann et al. [31]: table 5.6). This can be contrasted with data on streetwalkers in LA. Lillard et al. [32] found that about two thirds had had more than 10 clients in the last week. A Swedish study put the average number of clients per prostitute at around 50 a year (SOU [50]).

<sup>3</sup>Which does not preclude its being biologically reproductive. Since women always know if they are mothers, parenthood will not be lost on the prostitute. Hence, she will be a mother both in the biological and the social sense; biological fatherhood does not confer the same social benefits or obligations.

and the child.<sup>4</sup>

Although a gross simplification, for the purpose of this paper we will argue that a prostitute sells non-reproductive sex, which we will call “commercial sex”, while a wife sells reproductive sex (i.e. sex plus children). Note that the two activities thus defined are mutually exclusive.

The remainder of the paper is organized as follows. Since prostitution is a little known sector, we present some stylized facts in section 2. Section 3 presents the model. Section 4 provides further discussion.

## 2 Stylized facts

Critical to our model is the assumption that women sell and men buy, hence we start by motivating this assumption. A central result will be that prostitution is well paid, and the next section provides empirical evidence. The reader may skip to the model in Section 3 without loss of context.

### 2.1 Women sell – men buy

Both women and men sell commercial sex. Buyers are however almost invariably male (e.g. Philipson and Posner [42]:149; Posner [43]:92; West [57]). The 1992 NHLS survey of sexual practices among the US population found that 18 percent of men had ever paid for sex with a woman (Sullivan and Simon [52]) and that 2 percent of women had ever been paid by a man (Laumann et al. [31]).<sup>5</sup>

Females outnumber males as sellers, but that is not the primary reason we do not discuss homosexual prostitution. The premise of this paper is that female heterosexual prostitution is conditioned by the following realities of reproduction: fecund women are scarce; a child has by default only one known parent – the mother; and marriage gives a man parental rights to the children borne by his wife.

Scarcity of fecund women derives from the fact that the female parental investment exceeds that of males by far (Trivers [55]). Consequently, females should be able to extract compensation from males for mating opportunities, a theoretical proposition that has found substantial empirical support (see e.g. Wright [58]).

Humans not only mate, they also marry. We argue that men pay a premium for mating opportunities in-wedlock. The basic idea is that in addition to biological parenthood, people might be interested in a social affiliation, e.g. in a role as recognized parent and custodian. However, paternity is not obvious, and societies have chosen to vest mothers, not fathers, with the default custodial

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<sup>4</sup>Admittedly, this may be advantageous. In particular, for rich or otherwise powerful men, illegitimate children carry option value.

<sup>5</sup>The survey did ask men if they had been paid by a woman, and whether women had paid or been paid by a woman. The answers to these questions were not reported but incidence was presumably very low.

rights.<sup>6</sup> Thus, social parenthood is controlled by women, biological paternity confers no rights. While a woman cannot unilaterally impose fatherhood, she can unilaterally deny a man custodial rights and social recognition. Hence, men have to negotiate parental rights with the mother of the children, and the institution of marriage allows men unchallenged paternity and transfers custodial rights from the mother from the father. In this respect, marriage may be viewed as a contract on children where custodial rights are transferred from the mother to the father. As an immediate implication, we would expect men to transfer resources to women in exchange for marriage (Edlund [16]).

Hence, the wife provides the husband with children that are socially recognized as his, whereas the prostitute does not; and to the extent that men value social paternity, the willingness to pay for sex in marriage is higher than for sex outside. Polyandry, i.e. simultaneous marriage of several men to one woman, provides a case in point (Korn [30]). Clearly, each husband can only be a biological father in an expectational sense, but social fatherhood accrues to *all* husbands, suggesting that men rather share a woman in matrimony than in sin.

Obviously, marriage does not condition male (homosexual) prostitution in the same way. As might be expected, the stylized facts are also very different. For one, earnings are lower (e.g. SOU [51]; Ford [21]; Cameron et al. [8]), and so is the social stigma (e.g. West [57]). Women rarely pay men for commercial sex, possibly for the same reason that women sell to men: the relative scarcity of fecund women; and higher male promiscuity or sex-drive (e.g. Posner [43]; Wright [58]; Laumann et al. [31]).<sup>7</sup> Female homosexual prostitution is virtually unknown (e.g. SOU [50] and SOU [51]).

A central feature of our argument is that prostitution compromises female marriage market prospects. It rests on the assumption that men prefer their wives to be faithful (for instance from a desire to raise biological children). Hence, prostitution and marriage are largely incompatible for a women.<sup>8</sup> Empirically, unmarried women are over-represented among prostitutes (e.g. Lillard et al. [32]; Davis [12]).<sup>9</sup> Although some prostitutes marry, it is a fair guess that on average they do so on less favorable terms than they would have done otherwise. Also, some women prostitute themselves while married. However, in many cases these women are separated from their husbands or their marriage

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<sup>6</sup>Cf. Roman dictum *Mater semper certa est*. Mothers have not always had default custodial rights, e.g. children to slaves belonged to their master, not parents. However, mothers are favored over fathers.

<sup>7</sup>To the extent it occurs, it seems to be limited to older wealthy women. Age may explain why men, not women, are on the short end of the market. Affluence may explain high willingness to pay.

<sup>8</sup>These preferences may remain in the face of technological advances allowing for paternity establishment and non-reproductive sex if sexual jealousy is a hardwired psychological trait as suggested by the evolutionary psychology literature, e.g. Buss [7].

<sup>9</sup>For instance, Indian temple prostitutes, *devadasi*, did not marry mortals, but were the ‘wives’ of divinity; with obvious implications for profane life (O’Grady [38]). Courtesans, geisha, and hetaera, however accomplished and sometimes admired, were considered unsuitable wives, and as a rule did not marry (e.g. Posner [43]; Dalby [11]). An exception may have been the limited practice, mainly restricted to absolute rulers, of procuring women for prostitution and later marrying them off to underlings (Bullough and Bullough [6]).

may have ceased to exist in anything but form (e.g. Lim [33]).

Married men are under-represented among clients, they nonetheless constitute the bulk of demand (e.g. SOU [51]; Kinsey, Pomeroy and Martin [29]). We will take this stylized fact at face value. A crucial element in our model will be that married men also consult prostitutes. This begs the question why married men go to prostitutes (rather than buying from their wives who presumably would be low cost providers considering that they can sell non-reproductive sex without compromising their marriage).

There may be several possible reasons for this empirical regularity. For instance, there may be some value to promiscuity and love of variety might be more widespread among males (for instance, from greater reproductive rewards thereof, Trivers [55]). Alternatively, women and men are equally inclined, but women would have a higher opportunity cost of exercising this promiscuity from its incompatibility with marriage. However, note that if love of variety were sufficiently strong, it is unclear if marriage would survive at all, but as far as the authors are aware, marriage does exist in all societies, a fact consistent with only a moderate degree of love of variety.

Another possibility, closely linked to the observation that women are fecund for a shorter period of their life than men and hence are scarce on the partner market, might be that sex with an old woman is inferior to sex with a young woman.<sup>10</sup> Consider a population of men and women who live for two periods: young and old. Following Siow [49], women are fecund when young, men are fecund both when young and old, and marriage and sex is only desirable with a fecund partner. Consequently, men can marry at either age while women only marry while young. If the only reason for divorce is remarriage, then men who married while young, remain married when old unless they can remarry a young woman. Since there will be more men willing to marry than there are young women, not all old men can remarry. These men would remain married, but seek sex with a young woman. If young married women are barred from extra-marital relations, only prostitutes can satisfy this demand.

## 2.2 Market structure

Prostitution has been organized according to similar principles across different times and cultures. At the bottom we find street prostitution, followed by brothels, bars and clubs. Call girls and escort agencies occupy the middle to high slots, and kept women the top rungs. Higher end prostitutes are better looking, younger, and healthier; charge more per client and spend more time with each.<sup>11</sup> Typically, both earnings and working conditions are better more up market: clients are fewer, venues more agreeable, and client screening more selective.

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<sup>10</sup>Most forms of obviously non-reproductive sex is deemed inferior by the majority of males. Other than sex with old women, this category includes sex with men (including self), children, and animals.

<sup>11</sup>For instance, higher end prostitution may involve socializing with the client, while lower end prostitution tends to be more narrowly focused (e.g. Ramseyer [44]).

Legal regimes have varied, as has enforcement. It seems that brothels, when legal or tolerated, dominate street prostitution (e.g. Fisher [19]; Symanski [53]). Brothels can provide a better environment to both clients and prostitutes since reputational concerns and surveillance reduce the risk of robbery, assault and venereal disease. The degree of institutionalization also varies. For instance, Indonesia has in effect state operated brothels (Jones et al. [27]). In the middle ages, European towns ran brothels (very profitably, e.g. Otis [39]), and red light districts were common in many American cities until the early 20th century (e.g. Bullough and Bullough [6]; Rosen [45]).

Received wisdom has it that prostitutes are trapped either in economic or emotional bondage and work under slave like conditions. While owners of brothels, bars and clubs undoubtedly take their cut, there is little to suggest that the prostitute would not be left with substantial earnings (e.g. Flowers [20]:56; Ramseyer [44]). The extent to which streetwalkers pay off pimps is also unclear. A priori, the spot like nature of the transaction limits the role of middle-men. For instance, Lillard et al. [32] found that less than 6 percent of Los Angeles street prostitutes surveyed in 1990 and 1991 shared income with a pimp. Also, Nagaraj and Yahya [37], studying 44 prostitutes in Malaysia in the early 1990s, found that pimp fees amounted to less than two percent of what the prostitutes earned net of tip.

### 2.3 Pay

Reliable representative data on earnings in prostitution are difficult to obtain. Most studies rely on small samples of volunteers or individuals known to social workers or the police, a method susceptible to sample selection. Official earnings records (e.g. from court cases or social work) are likely to understate average earnings since they tend to reflect the conditions of less successful prostitutes (e.g. Ramseyer [44]), or the reformist mind of the author (e.g. Rosen [45]). Moreover, the scope for tax evasion is considerable (e.g. customers may not demand receipts). There is, however, overwhelming evidence that prostitution can be considered well paid. Ellis [17]:263 noted in the early 20th century that “we [have] to admit that no practicable rise in the rate of wages paid to women in ordinary industries can possibly compete with the wages which fairly attractive women of quite ordinary ability can earn by prostitution”. Rosen [45]:xvii in a study of American prostitution during the period 1900-1918 concluded that “When I look closely at the life stories of poor women during the early years of this century, I am struck again and again by most prostitutes’ view of their work as ‘easier’ and less oppressive than other survival strategies they might have chosen”. Edin and Lein [15] in their contemporary study of US welfare mothers found prostitution to be the most lucrative side income available to these low-skilled women.

Other studies paint a similar picture of prostitution being well paid. For North America, two of them stand out in that they allow for careful comparison between prostitutes and other low-skilled service workers. First, Lillard et al. [32] found that street prostitutes in Los Angeles (LA) had higher earnings and



lower qualifications than other women in the area. For a probability sample of 1,024 female street prostitutes in LA interviewed in 1990 and 1991, the annual average total earnings were USD 23,845 for prostitutes, while working women averaged USD 20,197 and female service workers only USD 17,192. This despite the fact that prostitutes were less educated and much younger than the female work force at large. For instance while 46 percent of all female workers and 40 percent of female service workers in LA had some college education (1990 census), this was true of only 20 percent of the street prostitutes. Second, Ford [21] analyzed a sample of street prostitutes in Montreal matched with a sample of hospital workers in 1993. 20 female and 26 male prostitutes were matched with hospital orderlies. Other than gender, the matching was done on the basis of marital status, number of years on the job, and time of shifts worked (evening versus day). The prostitutes had higher earnings than orderlies, and female prostitutes earned more than male prostitutes (among orderlies, men earned more than women). Whereas no orderlies of either sex earned more than CAD 50,000 a year, 75 percent of the female and 35 percent of the male prostitutes did so. This despite the finding that prostitutes had lower educational attainments. In terms of work environment, prostitution and hospital work were surprisingly similar both in terms of perceived stress level, and actual assault rates.

High earnings are not restricted to developed countries. “Studies of prostitution in Indonesia are consistent in showing relatively high earnings compared with earnings in other occupations ... freelancers ... may be making Rp. 3 million to 5 million a month (USD 1,500 to 2,500) ... This is much higher than what is earned by middle-level civil servants and other occupations requiring a high level of education.” (Jones et al. [27]:53). Nagaraj and Yahya [36] reported that for Malaysia in the late 1990s, earnings from sex work was 6 times that of other unskilled work. These and other studies are summarized in table 1.

**Insert table 1 about here.**

This paper argues that prostitution must be better paid than a regular unskilled job to compensate for foregone marriage market income. However, the finding that prostitution earns a premium over other unskilled jobs only corroborates our thesis if: i) the premium would remain if controlling for other aspects of the job, mainly riskiness and inconvenience; and ii) the order of magnitude brings the prostitute up to par with what she would have earned on the marriage market. We are unable to make that comparison. However, not all types of prostitution are risky, still the pay premium remains.<sup>12</sup>

**Prostitutes and other criminals** Are prostitution well paid because it is just another criminal activity, with its concomitant hazards?<sup>13</sup> Part of the pay

<sup>12</sup>Nude models are paid a premium despite low risk and working conditions similar to other modeling jobs, a premium that may be linked to the marriage market penalty associated with such modeling.

<sup>13</sup>Alfred Kinsey and his research group interviewed 175 prostitutes (154 in jail). Two thirds reported feeling no regrets about their choice of occupation. Reasons given were high income

premium undoubtedly stems from the disutility and earnings loss from incarceration or harassment by law enforcement. However, petty crime is notoriously poorly paid (e.g. Freeman [23]), and prostitution is lucrative in comparison. Moreover, prostitution is well paid even when legal (e.g. Symanski [54]).

**Short career** Prostitutes have their best earnings while young, as opposed to many other professions that have a flat or positive age earnings profile. Is this the reason why prostitutes have high earnings? Under the assumption that prostitutes are drawn from a pool of women who are and would remain unskilled, this cannot explain the earnings premium since the unskilled face a relatively flat age-earnings profile. Hence, a low-skilled woman who plans to remain so does not give up much in terms of training possibilities and hence future career options by a stint in prostitution.<sup>14</sup>

### 3 Model

To provide a rudimentary analytical framework, we consider a large female population of size  $N$  and, for simplicity, a male population of equal size.  $n$  denotes the size of the group of prostitutes. Each woman bears one child and marriage is monogamous. The child is a public good to both parents, if they are married, otherwise, only the mother derives utility from the child. Moreover, we assume that children are costless, everybody supplies one unit of labor and that there is an exogenous labor market in which men face a wage  $y$  and women a wage  $w$ .<sup>15</sup>

We assume that men obtain utility from child quality,  $k$ , conditional on marriage,  $m$ ; commercial sex,  $s$ ; and a third, exogenously supplied, consumption good,  $c$ , that also serves as the numeraire:  $u = u(k(m), s, c)$ . All goods are assumed normal, with the proviso that commercial sex is normal conditional on marital status.<sup>16</sup>

Throughout we will assume that male utility from marriage does not depend on the price of  $s$  or  $c$ . The price of marriage conditions the market price for sex, which generally speaking would impact on the trade off between marriage and singleness. However, our formal model will be restricted to the case where there is no feedback from the commercial sex market on the male willingness to pay for marriage.

Women do not care for sex, but derive utility from their children (independently of marital status) and consumption. Hence, we write female utility as:

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and comparatively easy work. However, those in prison did report disutility from the fact (Bullough and Bullough [6]:309).

<sup>14</sup>Were prostitutes drawn from a pool of women who could have had high powered professional jobs if in training instead, the alternative cost of prostitution would clearly be linked to foregone job market opportunities as well.

<sup>15</sup>Allowing for elastic labor supply would not change the results.

<sup>16</sup>That is, richer unmarried men spend more on prostitutes than poorer unmarried men, and richer married men more than poorer married men, but a richer married man may spend less than a poorer unmarried man, since he has also paid for marriage.

$v = v(k, c)$ . Women can either work in a regular job or be a prostitute. If she holds a regular job, she marries; while if a prostitute she does not.<sup>17</sup> Hence, the female choice is couched in terms of whether to be a wife or a prostitute.

In the base case, men and women are homogeneous, and we do not allow for investment in child quality, i.e.  $k$  is a constant. We modify this assumption in Section 3.2.1, by introducing investment in child quality, in order to be able to discuss the effects of an income shift. That allows for the utility of marriage to depend on the amount of resources allocated to it and alters the trade off between marriage and commercial sex. Although it may also be argued that utility derived from commercial sex can increase in the payment to the prostitute, e.g. she may rest more or eat better, we ignore that possibility invoking the typically short term nature of the relationship. Section 3.3 allows for earnings heterogeneity.

### 3.1 Base case

#### 3.1.1 The marriage market

Marriages are matched on a competitive market, where women sell and men buy. Child quality is a constant  $k$  and hence all women are equally good wives. Therefore, the compensation  $p_m^*$  paid in equilibrium in the marriage market must be the same for all wives. As long as not all men marry, they pay their reservation price. Hence, in an interior equilibrium, men are indifferent between marriage and bachelorhood.

Women have children irrespective of marital status. Since child quality is a constant, the choice between being a wife and a prostitute only involves comparing resulting consumption. If a wife, her budget constraint is  $c = p_m^* + w$ . If a prostitute, her budget constraint is  $c = p^*$ , where  $p^*$  is the price of commercial sex. In an interior equilibrium, revenues from the two activities must equalize, formally

$$p^* = p_m^* + w. \quad (1)$$

This condition provides an obvious link between the marriage and the commercial sex market, which will be key to the ensuing analysis.

#### 3.1.2 The sex market

We now proceed to determine the equilibrium price in the prostitution sector. Aggregate supply of commercial sex is

$$S(n) = n. \quad (2)$$

Marital status, price, and male income determine aggregate demand for commercial sex as

$$D(y, p_m^*; p, n) = n d(y; p) + (N - n) \bar{d}(y, p_m^*; p), \quad (3)$$

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<sup>17</sup>The third alternative, working in a regular job but not marrying, can be ruled out since we assume that the only downside of marriage for a woman is the foregone prostitution opportunity.

where  $d(y; p)$  is the demand of unmarried men, and  $\bar{d}(p, y; p_m^*)$  that of married men. The latter not only depends on male income and the price of commercial sex but also on  $p_m^*$ . We assume that a married man's demand is a fraction of an unmarried man's demand as follows

$$\bar{d}(y, p_m^*; p) = \lambda(p_m^*) d(y; p), \quad \lambda(p_m^*) \in (0, 1). \quad (4)$$

The important assumption is that  $\lambda(p_m^*) > 0$ . Were  $\lambda(p_m^*) = 0$ , the demand for commercial sex would not suffice to ensure supply, since the sex ratio balances and each man's willingness to pay for marriage exceeds his willingness to spend on a prostitute.<sup>18</sup>  $\lambda(p_m^*) < 1$  is not a serious restriction. At the very least, married men have paid for marriage and have less money at their disposal.<sup>19</sup> Clearly, the equilibrium number of prostitutes is increasing in  $\lambda(p_m^*)$ .

The sex market is in equilibrium if  $S(n) = D(y, p_m^*; p, n)$ , i.e. if

$$\begin{aligned} n &= n d(y; p) + (N - n)\lambda(p_m^*) d(y; p) \\ &= (n + \lambda(p_m^*)(N - n))d(y; p). \end{aligned} \quad (5)$$

The equilibrium condition (5) implicitly defines the price that clears the sex market,  $p^*$ , as a function of the number of prostitutes  $n$ .

### 3.1.3 Marriage and sex market equilibrium

We define equilibrium to be a situation in which no prostitute would do strictly better if she were a wife, and *vice versa*. In other words, if the number of prostitutes in equilibrium is positive, then

$$p^*(n^*) = p_m^* + w.$$

The left hand side gives the equilibrium revenue of a prostitute and the right hand side that of a wife. Note that while the former depends on the number of prostitutes, the latter does not.<sup>20</sup>

An equilibrium is stable if  $dp^*(n)/dn < 0$ . This holds if, at the equilibrium price, an additional prostitute increases aggregate supply of commercial sex more than aggregate demand. Stated formally, we require that

$$\frac{dS}{dn} > \frac{dD}{dn},$$

equivalent to

$$1 > (1 - \lambda(p_m^*))d(y; p^*). \quad (6)$$

<sup>18</sup>For instance, if  $u = (1 + k\mathbf{1}_m) s^\alpha c^\beta$ , then  $d(y; p) = \mu y/p$  and  $\bar{d}(y, p_m^*; p) = \mu(y - p_m^*)/p$ , where  $\mu = \alpha/(\alpha + \beta)$ , and thus  $\lambda(p_m^*) = \frac{y - p_m^*}{y} \in (0, 1)$ . A  $\lambda(p_m^*) > 0$  is not necessary if polygyny is allowed; or, maintaining monogamy, if there were more men than women in the population.

<sup>19</sup>A  $\lambda(p_m^*) < 1$  is also consistent with the view that commercial and marital sex may be substitutes, e.g. Gårdlund [24].

<sup>20</sup>Allowing for a downward-sloping labor demand function would not change the qualitative results.

A sufficient condition for inequality (6) to hold is that

$$d(y; p^*) < 1, \tag{7}$$

which is easily verified to be true from condition (5). Condition (7) says that at an interior equilibrium each prostitute must sell to more than one man. Note that the assumption that both unmarried and married men demand commercial sex is crucial for revenues as a prostitute to match those of a wife.

**Insert Figure 1 about here**

Having established that  $dp^*(n)/dn < 0$ , we now state conditions for an interior  $n^*$ . A sufficient condition for  $n^* < N$  is that  $p^*(N) < p_m^*$ . In words, if all women were prostitutes, revenue as a prostitute would be below that obtained as a wife. To see this, consider the case with only prostitutes. Then, there would be one man per prostitute. But since male willingness to pay for reproductive sex is higher than for non-reproductive sex, he would prefer this woman to be his wife instead of his prostitute.<sup>21</sup> For  $n^* > 0$ , we need that  $\lim_{n \rightarrow 0} p^*(n) \geq w + p_m^*$ , i.e. if there were only one prostitute, she would make more money than any of the wives. This need not hold, but would, for a sufficiently large population.

Consequently, there is a unique equilibrium with  $n^* < N$ , as illustrated in Figure 2.

**Insert Figure 2 about here**

To summarize the main findings so far:

**Proposition 1** *For large  $N$  the following statements hold:*

1. *There exists a unique equilibrium, for which  $0 < n^* < N$ .*
2. *A prostitute has more clients than a wife has husbands.*
3. *Prostitution pays better than wage work.*

**Remarks:**

1. Recall that for  $n^* > 0$  we need that  $\lim_{n \rightarrow 0} p^*(n) > w + p_m^*$ , which we argued will hold for large  $N$ . One implication is that all societies would have married women, and that societies without prostitution would be small.
2. This result is not an artifact of monogamy. It follows from the assumption that the prostitute sells a less valued good than the wife. Counting the number of men and women engaged in marriage and prostitution, it is easily seen that marriage is *woman* intensive and prostitution is *man* intensive.
3. The third statement follows from the indifference condition (1) and the assumption that  $p_m(y) > 0$ .

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<sup>21</sup>This need not hold if men love variety sufficiently, but we ignore that possibility since it yields the counterfactual implication that marriage would not exist in equilibrium.

**Tax on prostitution** Prostitution is controversial and rarely openly tolerated, although often tacitly so. To discuss possible conflicts of interest, let us consider a tax  $t$  per prostitute and the tax revenue destroyed. A tax on prostitution makes men poorer, and makes prostitution more expensive, both of which should reduce prostitution, and hence increase marriage. Note that while the supply of women is perfectly inelastic, for interior solutions earnings of wives and prostitutes must equalize. As a consequence, flows between the two sectors are perfectly elastic.

In our model the valuation, and hence price, of marriage is determined independently of that of prostitution. This implies that  $p_m$  is unaffected by a tax, which means that so must the net price to the prostitute be, i.e. in equilibrium a tax  $t$  on prostitution raises the price of prostitution by the full amount, and the higher price is achieved through fewer prostitutes. Hence, the incidence is fully borne by men.

It is not unrealistic to think that the price of prostitution might impact on  $p_m$ . In this case, women gain from the tax if it raises willingness to pay for marriage, and otherwise lose. Although either are possible, the former is probably more relevant than the latter.

If women were heterogeneous with respect to potential income as a wife (from e.g. labor market heterogeneity), then some of the tax incidence would fall on prostitutes, as further discussed on page 19. To summarize, men lose from a tax on prostitution, and that if not women, at least wives, may gain.

## 3.2 Income shifts

Raising the female wage  $w$  unambiguously lowers prostitution unless, of course, all women are already married. This follows from the assumption that reproductive (marriage) sex is a normal good and non-reproductive (prostitution) sex is normal conditional on marital status. From the male perspective, a rise in  $w$  implies a rise in the price of prostitution, while the price of marriage does not change. Hence from normality we know that both the income and the substitution effect lowers demand for prostitution, and hence the wife sector expands at the expense of the prostitution sector. In fact we do not need normality, this will hold unless prostitution is a Giffen good. Taking the female perspective, the intuition is that higher  $w$  increases the returns to working in the non-prostitution sector. Only at a lower number of prostitutes can revenues of prostitutes equal those of wives.

The effect of higher male income on the number of prostitutes, cannot be determined without additional assumptions. The purpose of the example below is to show that for a reasonable specification, prostitution decreases in male income.

### 3.2.1 Example

Here, we assume that child quality depends on the material resources allocated to the child. This introduces another distinction between marriage and pros-

titution. While the utility of commercial sex does not vary with its price, the utility of marriage will.

For simplicity, child quality is assumed to be the sum of parental contributions. Moreover, let male marriage market competition be in terms of contribution to the child, denoted  $p_m$ .<sup>22</sup> Hence, child quality is

$$k = \begin{cases} p_m + \gamma w, & \text{if the mother is married} \\ \gamma p, & \text{otherwise,} \end{cases} \quad (8)$$

where  $\gamma \in [0, 1]$  is the share of her income the mother contributes.<sup>23</sup> We assume that  $\gamma$  is constant across women.

Since children are only public goods to both parents if born in-wedlock, we specify male utility as:

$$u(k(m), s, c) = (1 + k\mathbb{I}_m) s^\alpha c^\beta,$$

where  $\alpha, \beta > 0$ , and  $\mathbb{I}_m$  is an index function that takes the value 1 if the man is married.

The male budget constraint is  $y - p_m\mathbb{I}_m - ps - c = 0$ . Hence, married men will buy  $s = \mu(y - p_m)/p$  and  $c = \eta(y - p_m)$ ; while unmarried men buy  $s = \mu y/p$  and  $c = \eta y$ , where  $\mu = \frac{\alpha}{\alpha + \beta}$ , and  $\eta = \frac{\beta}{\alpha + \beta}$ .

In equilibrium, men are indifferent between marriage and bachelorhood, implying that

$$(1 + k) \frac{(y - p_m)^{\alpha + \beta}}{p^\alpha} = \frac{y^{\alpha + \beta}}{p^\alpha},$$

which is equivalent to

$$(1 + \gamma w + p_m)^\rho (y - p_m) - y = 0,$$

where  $\rho = 1/(\alpha + \beta)$ .

Let  $\Phi(p_m, y) = (1 + \gamma w + p_m)^\rho (y - p_m) - y$ . For any given  $y > 0$ , there is a unique positive  $p_m^*$  that solves

$$\Phi(p_m, y) = 0, \quad (9)$$

since,

- $\Phi(0, y) = y((1 + \gamma w)^\rho - 1) > 0 \quad \forall y > 0;$

- $\frac{\partial \Phi}{\partial p_m} = (1 + \gamma w + p_m)^\rho [\rho(y - p_m)(1 + \gamma w + p_m)^{-1} - 1];$

this equation implies that  $\Phi$  is strictly increasing as long as  $p_m < \frac{\rho y - (1 + \gamma w)}{\rho + 1}$

and strictly decreasing for  $p_m > \frac{\rho y - (1 + \gamma w)}{\rho + 1}$ ;

<sup>22</sup>Since we will assume that women spend a constant fraction of their income on child quality, this formulation is equivalent to one in which the man splits the payment between the child and the wife.

<sup>23</sup>The consideration of economies of scale in the production of child quality in marriage suggests an alternative formulation:

$$k = \begin{cases} p_m + w, & \text{if the mother is married} \\ \gamma p, & \text{otherwise,} \end{cases}$$

While this would reduce the number of prostitutes in equilibrium, the qualitative results would remain. In particular, the comparative statics would not change.

- $\Phi(y, y) = -y < 0$ .

Eq. (9) implicitly defines  $p_m^*$  as a function of  $y$ . Moreover, from the above it follows that  $p_m^*$  is in the range

$$\max\left\{0, \frac{\rho y - (1 + \gamma w)}{\rho + 1}\right\} < p_m^* < y. \quad (10)$$

Aggregate demand in the prostitution market is

$$\begin{aligned} D(y, p_m^*; p, n) &= n d(y; p) + \lambda(p_m^*)(N - n)d(y; p), \\ &= \frac{\mu}{p}(ny + (N - n)(y - p_m^*)), \end{aligned}$$

(cf. eqs. (4) and (5)) where  $\lambda(p_m^*) = (y - p_m^*)/y \in (0, 1)$ .

Aggregate supply is  $S(n) = n$ . Hence, supply equals demand if

$$n = \frac{\mu}{p}(ny + (N - n)(y - p_m^*)).$$

The equilibrium price for commercial sex is therefore

$$\begin{aligned} p^* &= \frac{\mu}{n}(ny + (N - n)(y - p_m^*)) \\ &= \mu(p_m^* + (y - p_m^*)\frac{N}{n}). \end{aligned} \quad (11)$$

In equilibrium, women are indifferent between marriage and prostitution. Women derive utility from child quality and consumption. For simplicity, child quality and own consumption are assumed perfect substitutes as follows:  $v(k, c) = k + c$ . Hence for the wife,  $v = p_m^* + w$ ; and for the prostitute  $v = p^*$ . In equilibrium,

$$p^* = p_m^* + w. \quad (12)$$

Equations (11) and (12) give us an expression for the equilibrium number of prostitutes,

$$\mu(p_m^* + (y - p_m^*)\frac{N}{n^*}) = p_m^* + w$$

implying that

$$n^* = \frac{\mu(y - p_m^*)N}{(1 - \mu)p_m^* + w}. \quad (13)$$

One notable feature of this formulation of marriage and prostitution is that although men and women are indifferent between being married or not, children born to prostitutes are worse off (lower  $k$ ) than children born to wives. To see this, note that although female income is the same across states, quality of children born in marriage is  $p_m^* + \gamma w$  while that of children born to prostitutes is only  $\gamma p^* (< p_m^* + \gamma w)$ .



**Comparative statics** From eq. (13) it is clear that the number of prostitutes decreases in the female wage. Perhaps more interestingly, an increase in the male wage also reduces  $n^*$ . To see this, note that

$$\frac{\partial n^*}{\partial y} = \mu N \frac{(1 - \frac{dp_m^*}{dy})((1 - \mu)p_m^* + w) - (1 - \mu)(y - p_m^*)\frac{dp_m^*}{dy}}{((1 - \mu)p_m^* + w)^2}.$$

Hence, a sufficient condition for  $\frac{\partial n^*}{\partial y} \leq 0$  is that

$$\frac{dp_m^*}{dy} \geq 1. \quad (14)$$

Total differentiation of (9) yields

$$\frac{dp_m^*}{dy} = - \frac{(1 + \gamma w + p_m)^{\rho} - 1}{(1 + \gamma w + p_m)^{\rho} [\rho(y - p_m)(1 + \gamma w + p_m)^{-1} - 1]}. \quad (15)$$

Hence, (14) can be rewritten as

$$- \frac{(1 + \gamma w + p_m^*)^{\rho} - 1}{(1 + \gamma w + p_m^*)^{\rho} [\rho(y - p_m^*)(1 + \gamma w + p_m^*)^{-1} - 1]} \geq 1,$$

which is equivalent to

$$\frac{(1 + \gamma w + p_m^*)^{\rho} - 1}{\rho(y - p_m^*)(1 + \gamma w + p_m^*)^{-1} - 1} \leq (1 + \gamma w + p_m^*)^{\rho}. \quad (16)$$

Since  $\gamma w$  and  $p_m^*$  both are positive (implying that  $(1 + \gamma w + p_m^*)^{\rho} - 1$  is positive), a sufficient condition for (16) to hold is that the left hand side denominator is negative:

$$\rho(y - p_m^*)(1 + \gamma w + p_m^*)^{-1} - 1 < 0.$$

Multiplication with  $1 + \gamma w + p_m^*$  yields

$$\rho(y - p_m^*) - 1 - \gamma w - p_m^* < 0,$$

which holds if and only if

$$\frac{\rho y - (1 + \gamma w)}{\rho + 1} < p_m^*,$$

which, from inequality (10), we already know is true. Hence, (14) always holds, implying that  $\frac{\partial n^*}{\partial y} \leq 0$ , i.e. the number of prostitutes falls with higher male income.

These results suggest a possible reason for why prostitution would decline with higher incomes, male or female, and hence be less prevalent in richer countries. Section 4.2 provides further discussion of the empirical relationship between income level and prostitution.

### 3.3 Heterogeneity

So far we have assumed that all men and all women face identical wages, with the immediate consequence that no one was better off married. Allowing for male and female wage heterogeneity changes that. Clearly, prostitution would be more attractive to women with poor labor or marriage market possibilities. Let  $i \in [0, N]$  be a within sex rank index, where a higher  $i$  corresponds to a higher income, and let male and female incomes be denoted  $y(i)$  and  $w(i)$  respectively. To focus on the effects of heterogeneity let  $\hat{y}(i), \hat{y}'(i) > 0$  be the income spend on women (wife and prostitute). Moreover, we assume that marriage is positive assortative on income and that the marriage market is such that richer men pay more than poorer men for marriage.<sup>24</sup> If  $p_m(i)$  denotes what man  $i$  would pay for marriage, then  $p'_m(i) > 0$ , and actual expenditure on marriage is

$$\hat{p}_m(i) = \begin{cases} 0 & \text{if } i \text{ single} \\ p_m(i) & \text{otherwise.} \end{cases}$$

Consequently, individual expenditure on commercial sex is

$$p_i = \hat{y}(i) - \hat{p}_m(i),$$

and  $\partial p_i / \partial i > 0, i \neq n^*$  (see figure 3).

**Insert Figure 3 about here**

If there are  $n$  prostitutes, each prostitute earns

$$p^*(n) = \frac{1}{n} \int_0^N p_i di.$$

The income of the marginal wife is:

$$w(n) + p_m(i)|_{i=n}.$$

For an interior equilibrium, the equilibrium number of prostitutes,  $n^*$ , is such that

$$p^*(n^*) = w(n^*) + p_m(i)|_{i=n^*}.$$

Clearly, women with high labor market productivity,  $i > n^* \Leftrightarrow w(i) > w(n^*)$ , marry, and women with low productivity,  $i < n^*$ , are prostitutes. Similarly, men with high labor market productivity marry ( $y(i) > y(n^*)$ ), and men with low productivity do not. Expenditures on commercial sex increase in earnings conditional on marital status, and are discontinuous at  $n^*$ , as is  $\hat{p}_m(i)$ . Hence the poorest married man will spend less on commercial sex than the richest unmarried man, and the richest married men may spend more than any unmarried man depending on the shape of  $\hat{p}_m(i)$ . Remains to establish that there exists an interior equilibrium.

<sup>24</sup>This is consistent with the assumptions that child quality is an increasing function of investments therein, and that children are public goods in marriage. Endogenously determined  $p_m$  and matching would considerably complicate the exposition.

**Proposition 2** *There exists a unique  $n^* \in (0, N)$ .*

Proof: The income to the marginal wife increases in the number of prostitutes, since both the wife premium and the labor market income increase in  $i$ . However, the price prostitutes command does not decrease monotonically with the number of prostitutes.

Increasing the number of prostitutes by one adds  $p_m(i)|_{i=n}$  to the total expenditure on prostitutes. If  $p_m(i)|_{i=n} < p^*(n)|_{n=i}$  then the revenue per prostitute must fall, and conversely, if  $p_m(i)|_{i=n} > p^*(n)|_{n=i}$  the revenue must increase. Formally,

$$\begin{aligned} p^{*'}(n)|_{n=i} < 0 & \text{ if } p_m(i)|_{i=n} < p^*(n)|_{n=i}, \\ p^{*'}(n)|_{n=i} = 0 & \text{ if } p_m(i)|_{i=n} = p^*(n)|_{n=i}, \\ p^{*'}(n)|_{n=i} > 0 & \text{ if } p_m(i)|_{i=n} > p^*(n)|_{n=i}. \end{aligned} \tag{17}$$

Condition (17) implies that there is a unique  $n^* \in (0, N)$  if  $p^*(0) > p_m(0) + w(0)$  and  $p^*(N) < p_m(N) + w(N)$ . To see this note that then  $p^*(n)|_{n=i}$  and  $p_m(i)$  cross at most once since  $p_m'(i) > 0$  and  $p^{*'}(n)|_{n=i} = 0$  if  $p_m(i) = p^*(n)|_{n=i}$ .

As before,  $p^*(0) > p_m(0) + w(0)$  if  $N$  is sufficiently large. Moreover,

$$p^*(N) < p_m(N) \tag{18}$$

is a sufficient condition for  $p^*(N) < p_m(N) + w(N)$ . To see that condition (18) holds, note that if  $n = N$  the richest man buys the services from more than one prostitute; there are no wives, and  $p^*(N) < \hat{y}(N)$ . Hence, he would be willing to pay  $p_m(N) > p^*(N)$  to one woman to be his wife instead of his full time prostitute. Q.E.D.

**Insert Figure 4 about here.**

To summarize, with positive sorting on  $y$  and  $w$ , high earners are selected into marriage. The indifference condition will apply only to the marginal man and woman. Wives will be at least as well off as prostitutes (in the case of heterogeneous men and homogeneous women) or strictly better off (if females are heterogeneous). Similarly, married men are at least as well off as bachelors (in the case of heterogeneous women and homogeneous men), or strictly better off (if men are heterogeneous). Obviously, heterogeneity could also exacerbate the difference in resources available to children born to prostitutes and wives.

**Tax on prostitution** In the case of heterogeneous men and women, if the price men are willing to pay for marriage is unaffected, then a tax would reduce the number of prostitutes and lower the price of prostitution, in equilibrium, the price net of tax is equal to the marginal wife's revenues (which must be lower). If  $n_0$  is the equilibrium number of prostitutes without the tax, and  $n_1$  with the tax, then  $n_1 < n_0$ , and women in the range  $(0, n_0)$  lose from the tax,; those in  $(0, n_1)$  because the net price of prostitution falls, and those in  $(n_1, n_0)$  because their revenues as wives are lower than had they been prostitutes in the world without the tax. Women in the range  $(n_0, N)$  are unaffected.

### 3.3.1 Can she cook?

This section considers a third occupation for females: full time housewife, that pays  $\underline{w}$ . To simplify the exposition we will assume that this is a possibility for any woman. Let

$$\underline{n} := n : [w(i)|_{i=n} + p_m(i)|_{i=n} = \underline{w}].$$

We will assume that  $\underline{w} - p_m(i)$  is financed out of the  $y(i) - \hat{y}(i)$  that is spent on the other good, i.e. we assume that the full time housewife does not provide more sex or children than the working wife, and thus the willingness to pay for a housewife stems from the goods and services she produces and he would otherwise have purchased on the market. In this case, the male side is unchanged. For the housewife option to be relevant, i.e.  $n^* < \underline{n}$ , it must be the case that  $p(\underline{n}) < \underline{w}$ . Female income is now given by  $\max\{\underline{w}, w(i) + p_m(i)\}$  (see figure 5). Women who earn more than  $\underline{w} - p_m(i)$  will work and marry. Among the  $\underline{n}$  women who do not hold a regular job, a random  $n^*$  are prostitutes and the remaining  $\underline{n} - n^*$  are housewives.

**Insert Figure 5 about here**

Alternatively, housewives provide better quality or quantity of children (and or sex), and this is something men are willing to pay for. In this case, housewives would have higher productivity than prostitutes, and men married to housewives would spend less on prostitutes, holding male income constant.

## 4 Discussion

### 4.1 Surplus of males

The model section assumed balanced sex ratios. However, surplus of males may be an important determinant of prostitution. For instance, prostitution was common in the American frontier towns and mining camps, where men outnumbered women massively (Bullough and Bullough [6]:219). African urban prostitution has been linked to high sex ratios (e.g. Boserup [5]; Bakwesegha [2]) as has the institutionalization of municipal brothels in Medieval Europe (e.g. Rossiaud [46]). Prostitution in South East Asia has been linked to male sex ratios from colonial settlement policies; the presence of military bases, and more lately, sex-tourism (e.g. Nagaraj and Yahya [37]; Lim [33]; Muroi and Sasaki [35]; O'Grady [38]). In China, the deficit of young women, partly due to the one-child policy in force since 1979, has gone hand in hand with an increase in prostitution. Beijing, a city of 12.5 million inhabitants, may have 200,000 to 300,000 prostitutes (Paris Match, October 2000).

This paper points to two mechanisms that could link male sex ratios and prostitution. First, high sex ratios (men to women) can make prostitution more profitable relative to marriage, and hence support a higher fraction of women in

prostitution (recall Proposition 1, prostitution is man-intensive relative to marriage). Second, a substantial surplus of men often results from men temporarily congregating on a locality, and this may have stronger impact on prostitution than if these men resided there more permanently. The proposed reason is that while residing men participate in both the marriage and the sex market, men in transit are only on the latter. Hence, returns in the sex market rise disproportionately and induce a greater supply response than if these men had been on both markets. Examples range from Medieval crusaders to contemporary sex-tourists.

The relationship between a surplus of males and prostitution is however not clear cut. For instance, sex ratios rose following the Black Death that ravaged Europe in the 14th century, but prostitution actually declined. Rossiaud [46] causally linked these events, the argument being that mortality affected women and the poor disproportionately, resulting in an improved marriage market for surviving women. This reasoning is, however, consistent with the logic of this paper, and points to the qualifications that need to surround conclusions about the relationship between the prevalence of prostitution and the sex ratio. In particular, the effect of a change in the sex ratio will depend on how such a change alters the marriage market competition.

## 4.2 Poverty

Prostitution has been associated with poverty. Low female labor market earnings potential is often taken to be an important reason for why women go into prostitution, and in any society a higher proportion of poor women prostitute themselves (e.g. Bullough and Bullough [6]; Davis [12]). These stylized facts are consistent with the findings of Sections 3.2 and 3.3.

Moreover, we also point to the possible role of low male earnings (Section 3.2.1). Prostitution is more common in poor than rich countries. For instance, the Global Program on AIDS/ World Health Organization estimated the proportion of men using prostitutes in any given year to be 11 percent in the Ivory Coast, 10 percent in Lesotho, 8 percent in Togo and 13 percent in Kenya. This can be contrasted with, for instance, a French study that estimated that 3.3 percent of French men had visited a prostitute in the past 5 years (Carael et al. [10]; de Graaf [13], both cited in Atchison et al. [1]:184).

Moreover, prostitution has seen a secular decline in rich countries. For instance, while the Kinsey study, conducted in 1938-47, concluded that about 69 percent of the American white male population will ultimately purchase sex from a prostitute, the incidence among men surveyed in the NHSLS study was 18 percent (Kinsey, Pomeroy and Martin [29]; Sullivan and Simon [52]). One may also note that during the half century that separate the two studies, male contact with prostitutes ceased to be considered common and normal. Part of this is undoubtedly due to better and cheaper contraceptives that have increased the supply of non-commercial, non-marital, sex (e.g. Posner[43]:132). However, higher income levels may also have played into the shift away from prostitution.

### 4.3 Ill repute

A salient feature of prostitution is its poor reputation, a quality largely consistent with the logic of this paper. We argue that once a woman is identified as a prostitute, her ability to marry is reduced. Since this in itself is costly, anything that marks a woman as a prostitute forms a basis for stigma.<sup>25</sup> In Roman antiquity, prostitutes were required to wear special attire that clearly singled them out, a practice that resurfaced in Medieval Europe. Zoning laws are similar in spirit. Another aspect of stigma is that it works as a deterrent, keeping wives on the straight and narrow.

However morally corrupt, prostitution has often been considered a necessary compromise. Thomas of Aquinas likened prostitution to a sewer that helped keep the palace clean: the lesser of two evils (Jolin [26]), a theme mirrored in the double standard, written accounts of which dates at least back to the Old Testament's story of Judah and Tamar (Genesis 38), by which the purchasing of commercial sex is condoned, but the sale of the same is condemned. Incidentally, the socio-economic profile of buyers also tend to be more 'normal' than that of sellers (e.g. Sullivan and Simon [52]; Atchison et al. [1]).<sup>26</sup>

While attitudes towards prostitution have vacillated between condemnation and laissez-faire, the prostitute herself has suffered a consistently poor reputation. The prostitute serves men in a way that would be scandalous if done by a wife. The Madonna – Whore dichotomy may have risen from the need to keep the two separate. Consistent with the premise of this paper, the wife was pigeon-holed at the high end of the social spectrum, and the harlot at respectable distance.

This paper points to the conflicting roles of wife and prostitute, every prostitute could have been a wife, another possible reason why societies have taken a harsh view of prostitution. One implication is that if social segregation is such that the supply of prostitutes does not impinge on the supply of wives, for instance if there is a relatively large slave class, public policy towards prostitution would be more lenient. This arrangement may have characterized Greek and Roman Antiquity. Generally speaking, men of higher social status are unlikely to be constrained by prostitution in their marriage choices, and are thus more likely to support a permissive policy. It is in the working class that the pinch of prostitution is felt by men. How this is translated into public policy will differ from context to context. For instance, in America, so called 'whorehouse riots', in which a mob crowd tore down brothels or 'bawdy houses', were common occurrence in urban areas until newly formed police departments took over the role of regulation in the mid 19th century (Rosen [45]).

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<sup>25</sup>Note that stigma is not part of what we generally think of as working conditions. Rather, it is a cost that is closely linked to whether people *know* about the state of affairs or not.

<sup>26</sup>Although largely true, the client group is probably not a random sample. For instance, Kinsey, Pomeroy and Martin [29] found a much higher incidence of intercourse with prostitutes among men with lower levels of education; and Posner [43] hypothesized that with more normal sex supplied by non-prostitutes, prostitutes will concentrate on servicing less common predilections, the demand for which might be correlated with socio-economic and mental health status.

Prostitution may give women an alternative to marriage, but wives and prostitutes do not share interests. To the extent that women as wives also sell non-reproductive sex, prostitutes present direct competition. More importantly however, inability to ascertain paternity on the part of men coupled with the inability to commit to faithfulness on the part of women, may motivate vilification or victimization of the prostitute. Female capacity of opportunistic promiscuity threatens the very premise of the patriarchal family, and the prostitute is a constant reminder of this ability. Family law almost invariably reads: the mother is the woman who bears the child, the father is the husband of the mother (Glendon [25]). This construction only has substance if women are faithful to their husbands. Thus, the ideal wife does not stray. The less she likes sex, the more she can be trusted. In the Victorian era, female abhorrence of sex was a much prized virtue (e.g. Fisher [19]). If women only submitted to their husband as a patriotic duty, no man would be cuckolded. The notion that females were naturally repulsed by sex was so well established that early studies into the reasons why women become prostitutes focused on the psychological make-up that could produce what was considered deviant behavior (e.g. Ellis [17]). Other epochs and cultures were not so convinced, women were suspected of being overly sexual and willing adulteresses (e.g. Bullough and Bullough [6]; Cantarella [9]). Women have suffered domestic seclusion, bound feet, and mutilation as a result of inability to commit to fidelity. They do not need prostitutes to remind them of why.

Prostitution is not only the concern of men and women, children may also be affected. To the extent children benefit from being born in-wedlock, they suffer from prostitution, as pointed out in Section 3.2.1.

Public health concerns have also played into the view of prostitution. Prostitution is commonly viewed to aid the spread of venereal disease (for a differing view see Philipson and Posner [42]).

#### 4.4 Voluntary?

The idea that prostitution has to be well paid to compensate for foregone marriage market opportunities only makes sense if women choose prostitution (provided that they choose marriage).<sup>27</sup> Detractors of this approach would point to victimization, rather than choice. In fact, bondage or even slavery, has commonly been thought to bring women into prostitution. Although there are instances of this, we believe a substantial fraction of prostitution can be characterized as voluntary. For instance, economic realities seem to play into how willingly women are thus victimized, belying the assumption that trickery is an important reason for why women become prostitutes. In the late 19th and early 20th century, reports of ‘white slave trade’ surfaced in American newspapers and public concern with forced prostitution bordered on hysteria (Bullough and Bullough [6]). However, there is little to suggest that slavery is a more common

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<sup>27</sup>The alternative formulation that women choose neither, but are sold into either marriage or prostitution, would also work.

feature of prostitution than other low skilled professions. In times and places where forced labor has been used, prostitution was no exception. Examples include slaves in Roman and Greek Antiquity and the so called comfort women held by the Japanese army during World War II.

Poor conditions or riskiness are by themselves not sufficient to establish bondage or slavery as the alternative could be worse (e.g. Ramseyer [44]). For instance, Muroi and Sasaki [35] reported that Thai prostitutes working in Japan, after having paid off their debt to the trafficker and bar owner, were free to stay on or freelance. Interestingly enough, most choose to do so rather than returning immediately when debt free, which indicates at least *ex post* voluntariness. Whether it was *ex ante* voluntary can only be speculated about. However, the savings were substantial, often enough to afford the building of a house in their home village and it was this kind of display of affluence that had attracted the women in the first place.

## 4.5 Wife and prostitute?

It is a fair guess that to the extent former prostitutes marry, on average they do so on worse terms than they would have had in the absence of their past. Loss of virginity, even if through rape, at least used to entail a significant loss of marriage market value of a woman (e.g. Rossiaud [46]). The stigma associated with prostitution remains in societies in which female premarital virginity has ceased to be particularly prized. At least until 1974, ‘wife prior to marriage had been prostitute without knowledge of husband’, was a fault ground for divorce in Virginia (Freed [22]). The law may have changed, but as one former call girl put it “...When dating ‘regular’ men in the conventional manner, I found that by revealing my secret prostitution self I was provided the perfect escape from a relationship I no longer desired.” (Blake [3]).<sup>28</sup>

One may note the impracticality and inefficiency of a blanket refusal to marry former prostitutes in case such women constitute a sizeable chunk of the pool of otherwise marriageable women. A conjecture is thus that high rates of prostitution should go hand in hand with high marriage rates of former prostitutes. Of course, the causality also works in reverse. If prostitution does little harm to marriageability, this facilitates entry into prostitution. Peracca, Knodel and Saengtienchai [41] argued that there is relatively little stigma attached to prostitution in Thailand as measured by perceived marriageability of former prostitutes. It may be noted that in the early 1990s there were approximately 75,000 sex workers in Thailand and an additional 100,000 Thai women worked as prostitutes abroad (Boonchalaksi and Guest [4]).<sup>29</sup> For a population of 60 million, these figures imply that a significant share of the female population sell sex at some point in their life.<sup>30</sup> In the Middle Ages, many former prostitutes

<sup>28</sup>“Once a prostitute, always a prostitute” was the rule for registration of prostitutes in ancient Rome (Scott [48]).

<sup>29</sup>The category sex workers includes, but is not restricted to, prostitutes.

<sup>30</sup>If prostitutes work for four years, a back of the envelope calculation suggests that  $175,000/2,000,000=8.75\%$  of all women will work as prostitutes.



did marry (Rossiaud[46]:36), as did former prostitutes in the American West (Bullough and Bullough [6]:220) and it may have been the case of most prostitutes in pre World War II Japan (personal correspondence Mark Ramseyer).

Moreover, when a wife and husband have completed their reproductive life together, the woman would presumably be free to prostitute herself. However, earnings in prostitution declines with age. Consequently, when the opportunity cost of prostitution is lower, so are the financial rewards (e.g. Otis [39]; Parera et al. [40], Nagaraj and Yahya [36]), observations that may go some way towards understanding why married women turn to prostitution, but not in any great numbers.

The simplifying assumption that by marriage women give up nothing but the possibility to work as a prostitute implied that all unmarried women were prostitutes. Of course, in real life not all unmarried women are prostitutes. They may have elected to stay unmarried for reasons exogenous to the model (see e.g. Edlund [16]) or they may intend to marry. Therefore, the predictions of the model should be interpreted in terms of predictions about prostitution rather than marriage.

**Polyandry – polygyny** We conclude with a brief note on prostitution and the evolution of family forms. There are no recorded cases of societies in which polygyny (several wives) and polyandry (several husbands) overlap. Yet, previous theories – ignoring prostitution – have made a strong theoretical case for the former to appear at the top of the social ladder and the latter at the bottom (e.g. van den Berghe and Barash [56]; Korn [30]). Empirically, polyandry seems to be a marriage pattern that only survives under very precarious conditions despite the apparent complementarity between polygyny and polyandry. Prostitution provides a possible explanation why the two do not co-exist. Consider the following example: the sex ratio balances and some men can afford to take several wives. This would imply that not all remaining men can take one wife each. In principle, these men may prefer to share a wife. However, polyandry among the lower social rungs breaks down if women prefer to be prostitutes to the whole population rather than wives to a subset of poor men.

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Reference Period Place	Pay	Comparison	Legal	Other Information
Rossiaud [46] <b>mid-15th century</b> France	One blanc/half hour	Two blancs/day Agricultural work	yes	
Ramseyer [44] <b>1934</b> Japan	884 + RB 575 + RB	130 Factory work	yes	Prostitutes Geisha
Kahmann and Lanzerath [28] <b>1947-72</b> West Germany	More than	“working women”	yes	Complete record of cases of proxenitism (1,195 obs)
Symanski [54] <b>1973</b> Nevada	350/week+RB	135/week*	yes	Brothel
Muroi and Sasaki [35] <b>early-1980s</b> Thailand	10,000+tip	150-450 Housemaid	no	
Davis [12] <b>1981</b> Munich	50,000-110,000/year	25,175/year Per capita GDP 1981	yes	
Lillard et al. [32] <b>1990-91</b> Los Angeles	23,845/year	17,192/year Female service worker	no	Probability sample 1,024 street prostitutes lower qualifications and younger than women in area
Ford [21] <b>1993</b> Montreal	75% female, and 35% male prostitutes earned more than 50,000/year	no orderlies earned more than 50,000/year 24,000/year Per capita GDP 1993	no	Street prostitutes 20 female and 26 male matched by age and gender with orderlies
Jones et al. [27] <b>mid-1990s</b> Indonesia	USD1,500-2,500	much higher than mid-level civil servant	no	
Parera et al. [40] <b>1995</b> Barcelona	USD300-2,000/day USD1,000-2,000/day USD1,000	USD18,799/year Per capita GDP 1994	no	Low end brothels Saunas Call girl, one client per night
Morell [34] <b>1997</b> Germany	400-1,200/day net of room rent	42,224/year Per capita GDP 1995	yes	
Morell [34] <b>1997</b> Brazil	30/client or 100/night	120/month Minimum wage	no	
Nagaraj and Yahya [37] <b>late-1990s</b> Malaysia	6 times	Unskilled work	no	44 street prostitutes

Notes: Figures in local currency unless otherwise indicated. Per capita incomes from national yearbooks, various countries and years. Prostitutes are female unless otherwise indicated. RB - Room and Board; \*-Statistical abstract of the US 1974:table 576, average pay in services USD3.36/hour.

Table 1: Earnings of prostitutes

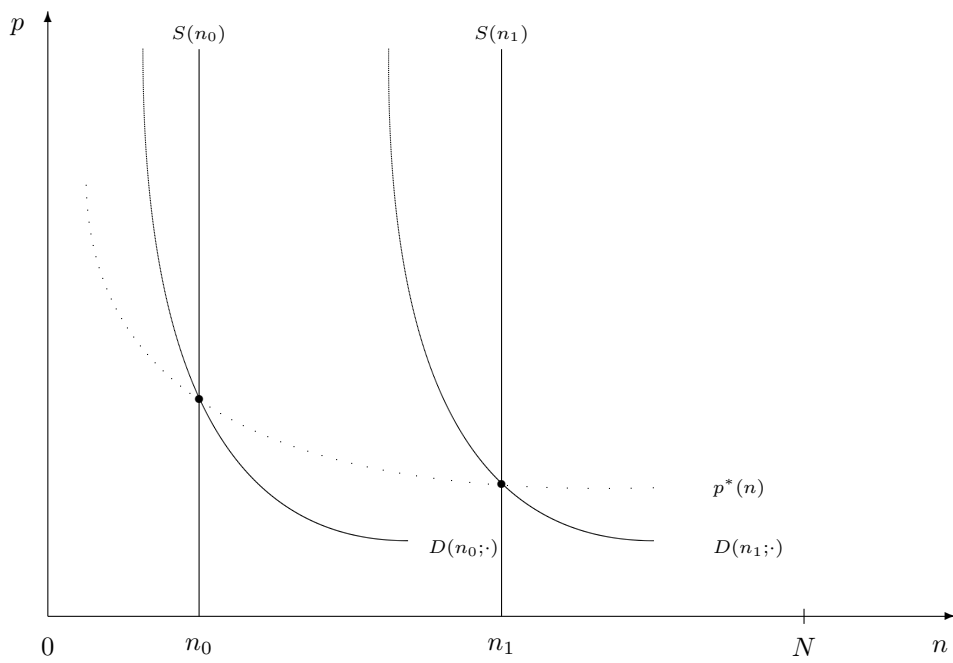


Figure 1: Sex market equilibrium

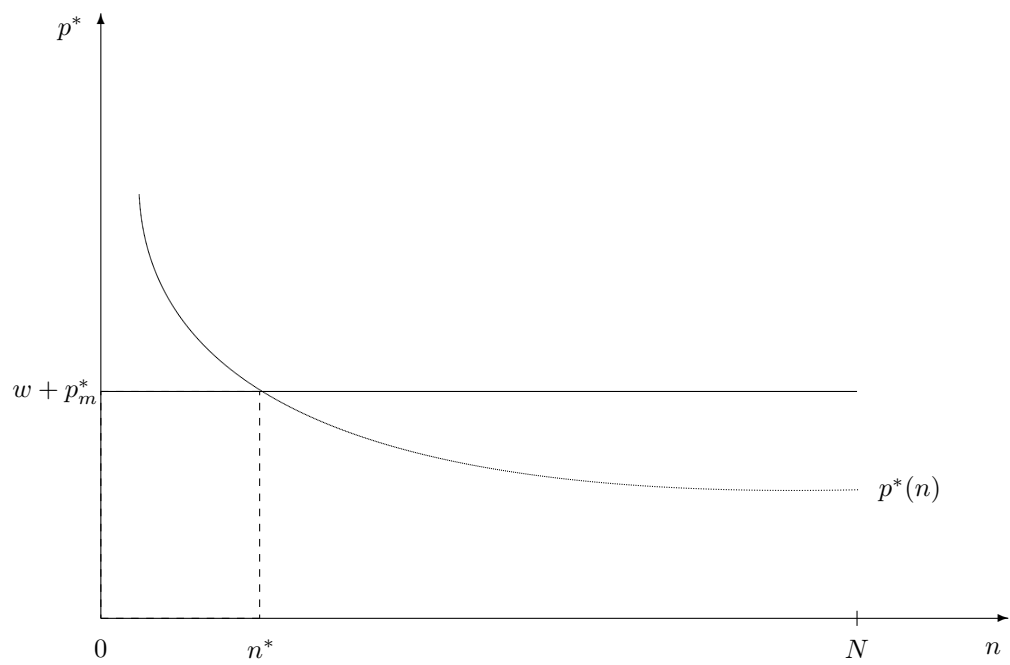


Figure 2: Marriage and sex market equilibrium



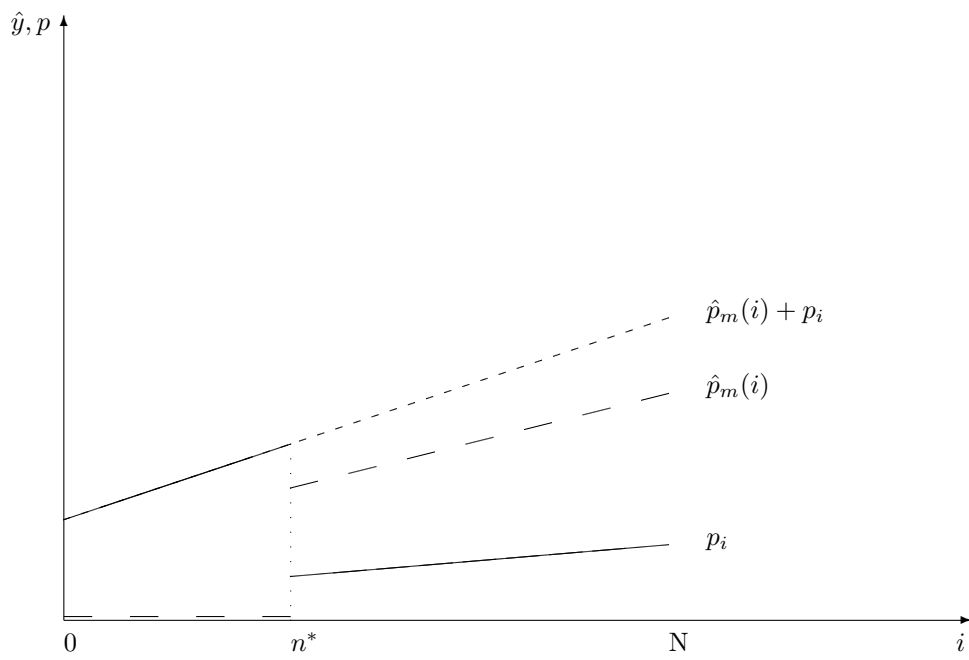


Figure 3: Expenditures on wife and prostitute by income rank  $i$

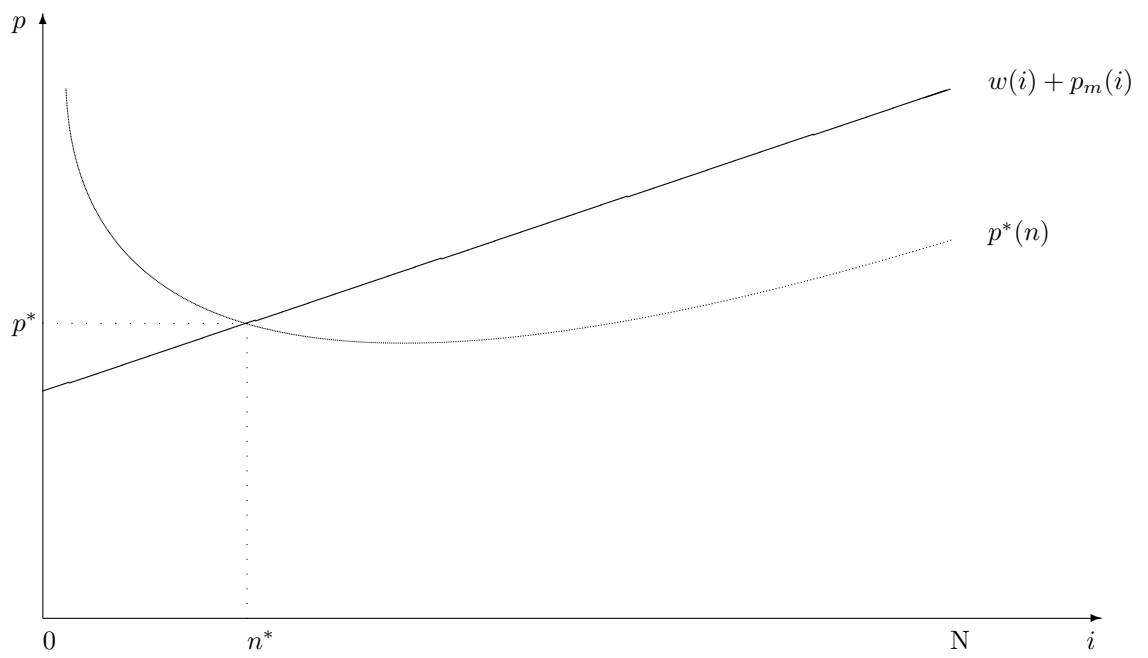


Figure 4: Marriage and Sex market equilibrium

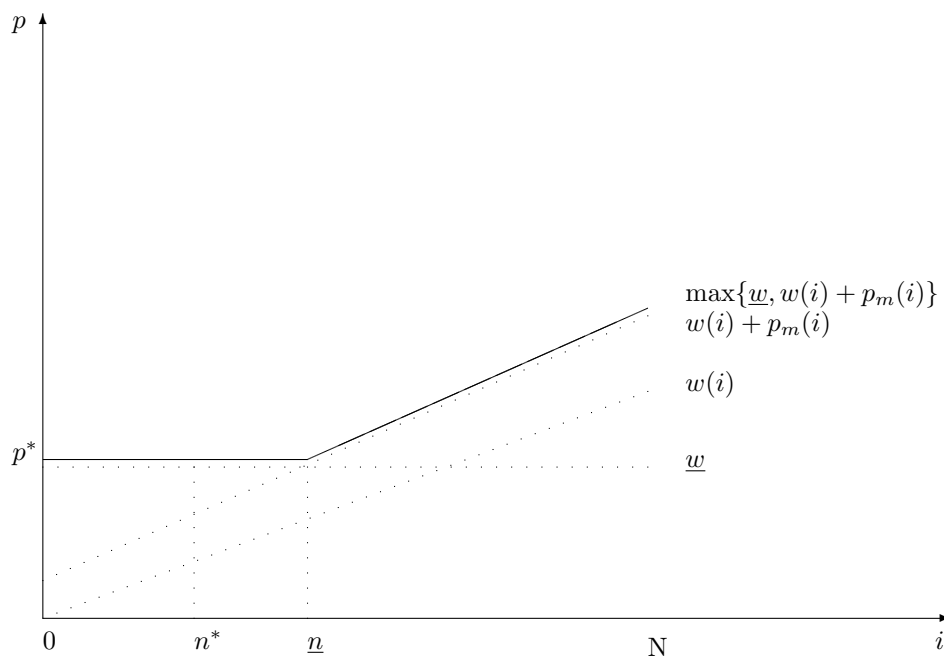


Figure 5: Equilibrium with housewives