

***Sex work vs. sexual exploitation in the European Union:
What are the likely guesstimates for prostitution?****

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Abstract: Prostitution regimes in the EU-28 include prohibition, regulation and abolition; economics literature tackles this typology from the perspective of both free sex work and forced labour. We review the data sources on the demand-side and the supply-side in order to gauge how large is the sex market and informal employment for sex workers. We calculate Estimates 1A and 1B from miscellaneous sources, whereas HIV prevalence among sex workers provides Estimates 2A and 2B. We calculate Estimate 3 from victims of sexual forced labour trafficking. We design an OLS model to test the five Estimates of prostitution according to GDP per capita, legislation, supply-side and demand-side variables. Last, we assess which might be the most likely Estimates as regards GDP enhancement in 2010, with respect to National Accounts adjustment for illegal production and consumption expenditure. Hence, we come up with a lower bound Estimate that may be used as a benchmark for macroeconomic policy.

Keywords: Informal employment; National Accounts; Non Observed Economy; sex work; sexual exploitation trafficking.

JEL: E26, J46, J47, K42, O17

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1. Moral and economic issues on prostitution

Prostitution, the controversial so-called “oldest profession”, raises moral and economic issues such as social stigma, health risks and tax evasion, echoing the philosophers and economists (Mandeville, Malthus and Stuart Mill) whose doctrines inspired current legislation regarding prostitution in the European Union (EU-28). Advocacy for free sex including prostitution (Hakim, 2015) confronts the virtuous stance on abolition (Charpenel, 2013),

Prostitution is back again on the agenda: the EU political arena (Mendez Bota, 2014; Schulze, 2014) discussed the issue, which also deserves special attention from Eurostat since illegal production and namely prostitution is included into the national accounts since 2010. Strangely enough, no assessment has been yet applied to varied expert calculations. It is our purpose to fill the gap and provide a tentative benchmark for the EU-28, wherein three different policy regimes rule prostitution: *prohibition*, *regulation* and *abolition* (Jakobsson and Kotsadam, 2013).

As for *prohibition*, prostitution is all but evil and a criminal offence. It makes prostitution illegal as well as the prostitute liable to penalties. Such is the case for four EU Member States: Croatia, Lithuania, Malta and Romania (until decriminalisation in 2013). Among the EU-28, these countries account for 1.63 percent of EU GDP and 5.5 percent of total population in 2010.

As for *regulation*, in line with Mandeville (1724), prostitution is a necessary evil as well as a trade. It refers to where prostitution in brothels is legal, including tax collection from the State and labour contracts for sex workers. Such is the case for four EU Member States that contribute 29.2 percent EU GDP and almost one fourth (23.26 percent) of total population in 2010: Austria, Germany, Greece and the Netherlands.

As for *abolition*, in line with Stuart Mill (1870) and the United Nations Universal Declaration of Human Rights (1948), sexual exploitation is evil and it should be extinct as well as non-coercive sex trade. Prostitution must be banned with the criminalisation of third parties, such as pimps and brothels managers, but not the prostitutes themselves. This policy regime applies to the remaining 20 EU member states that account for 69.1 percent EU GDP and 71.2 percent of total population in 2010: Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Hungary, Ireland, Italy, Latvia, Luxembourg, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden³ and the UK.

It is worth mentioning that all three regimes ban human trafficking for sexual exploitation. Hence, there are two distinct but related approaches concerning prostitution. One addresses the issue of prostitution as legal sex work, a market economic activity that deserves thorough analysis in terms of supply and demand as well as estimates with regard to employment and value added. The other one addresses the issue of coercive prostitution in terms of victims of sexual exploitation or forced labour; the emphasis is upon illegal trafficking within a given country as well as cross-border migration, which is used as an approximation in order to estimate overall prostitution including both coercive and non-coercive sex work that actually blurs such distinction.

The paper is structured as follows. Section 2 reviews the economics literature with respect to sex work and sexual exploitation. Section 3 records the data sources on the demand-side and the supply-side in order to assess how large is the sex market and employment for sex workers. We calculate Estimate 1, thanks to data from an international NGO checked against other miscellaneous sources, whereas HIV prevalence provides Estimate

³ Only the buyer is criminalised. Hence, *neo-abolitionism* may be added to the typology as a fourth regime.

2. Section 4 provides a focus upon the patterns and magnitude of sexual exploitation trafficking according to Europol, the ILO, Eurostat and the UNODC in 2010; we calculate Estimate 3 from victims of sexual exploitation. Section 5 designs an OLS model to test the Estimates 1, 2 and 3 for prostitution according to GDP per capita, legislation, supply-side and demand-side variables. Section 6 gauges prostitution as regards GDP enhancement in 2010, with respect to National Accounts adjustment for illegal production as well as from consumption expenditure. Conclusion discusses what might be the most likely Estimates according to adjusted National Accounts figures for 2010.

2. Literature review on prostitution

Two strands in the recent economics literature address prostitution. One explores various theoretical models based upon and extending the general assumption of rational choice behaviour from sex workers, which design predictions as regards supply and demand as well as equilibria and policy regimes. The other most recent strand focuses on victims of sexual exploitation. It is worth noticing that very few papers address the empirics of prostitution.

Edlund and Korn (2002) design the first formal model of occupational choice involving voluntary prostitution according to rational choice. They state the prostitution puzzle as “low-skilled, labor intensive, female, and well paid”. They explain that sex workers draw a compensating differential due to the foregone opportunity to “sell” their fertility in the marriage market. In so doing, they sketch a link between the labour market and the marriage market that holds for only one occupation.

Della Giusta et al. (2009) extend the standard model of rational action, including social interactions and social sanctions. They focus upon stigma as a loss of reputation, which affects social standing for both clients and sex workers. Attitudes towards the exchange of paid sex shape the dynamics of demand and supply and the resulting markets as they affect regulation, location, prices, and risk for both sex workers and clients, as well as the institutional form of organisation of the trade (brothels, pimps, escort services, etc.) and the entry mode (including trafficking).

Farmer and Horowitz (2013) address the prostitution puzzle: “contradictory occurrence of free entry, low-skill requirements, and high wages”. They include intermediaries into a theoretical analysis of market structure with heterogeneous buyers and sellers as well as information asymmetry. In this framework, the market is segmented into separating equilibria and intermediaries affect the distribution of surplus. If brothels are authorized, they are likely to reduce information asymmetry and costs as well as promote economies of scale and quality.

Lee and Persson (2015) model a semi-coerced market with voluntary prostitutes and trafficking. Their theoretical paper investigates whether prostitution laws can reach the socially optimal outcome that would arise in a decriminalized market free from trafficking. They conclude that no regulatory regime currently used achieves this goal, but suggest that a combination of the “Dutch” regulatory and the “Swedish” neo-abolitionist regimes would.

Immordino and Flaviano Russo (2014) set up an equilibrium model of prostitution where potential clients and sex workers simultaneously demand and supply sex under three different legal regimes and the harm associated to each. Under prohibition, prostitution services are exchanged on an illegal market and the law is enforced through sanctions for clients and/or sex workers. Under regulation, a legal market for prostitution where the sex workers pay taxes coexists with an illegal one where sex workers dodge taxes; hence,

enforcement is needed. In addition, the government can also perform health policies targeted to the legal market, in order to reduce the transmission of Sexually Transmittable Diseases, both for customers and sex workers. Under a laissez-faire regime, prostitution services are traded on a legal and unregulated market. As for the comparison of alternative policies, an application to Italy documents a tradeoff between equilibrium and social optimum. Prohibition is more effective at decreasing the total quantity of prostitution services than regulation and laissez-faire regimes. Regulation is more effective than prohibition in alleviating the harm associated with prostitution.

Three papers address the issue of sexual exploitation trafficking.

Akee et al. (2011) use a game-theoretic model to explore three characteristics of the human trafficking market –the cross-border mobility of traffickers, the bargaining power of traffickers and the final buyers, and the elasticity of buyers' demand. They estimate a gravity model of trafficking upon a sample of 190 countries. Results show some evidence that domestic and foreign enforcement do mutually reinforce one another, due to mobility, there is partial bargaining power, and demand is inelastic. They find that legal prostitution exerts no effect on human trafficking in a two-country pairs cross-sectional sample (country source to host country); whereas using instrumental variables shows there is a negative effect on human trafficking.

Cho et al. (2013) point out that the issue of legal prostitution as such is not addressed, because the authors confuse legalisation with weak enforcement of anti-trafficking laws, whereas human trafficking is illegal even if prostitution is legal.

Cho et al (2013) address the effect of legalising prostitution upon a global dataset of 150 countries. On the demand-side, some clients will be deterred from consuming commercial sex services if prostitution is illegal. Hence, legalising prostitution will increase demand for prostitution. On the supply side, legalising prostitution will induce some potential sex workers (or their pimps) to enter the market. Supply might decline due to tax collection from legalised prostitution. However, prostitutes unwilling to comply with tax payment, can operate illegally. The legalisation of prostitution has two opposite effects on the incidence of trafficking, a substitution effect away from trafficking and a scale effect increasing trafficking. Hence, the overall effect is theoretically indeterminate and becomes an empirical issue.

Jakobsson and Kotsadam (2013) use the ILO and UNODC datasets and find a positive effect of legal prostitution on trafficking in a cross-sectional dataset of 31 European countries. Sexual exploitation trafficking of women is least prevalent in countries where prostitution is illegal, most prevalent in countries where prostitution is legal, and in between in those countries where prostitution is legal but procuring illegal. Case studies of Norway and Sweden that have criminalised buying sex support the possibility of a causal link from harsher prostitution laws to reduced trafficking.

3. How large is the sex market in the EU?

There are various criteria to gauge the market for sexual services depending on their prices, premises and working schedules. Prostitution encapsulates three broad distinct segments: the upper tier or luxury prostitution (escorts and call girls); the intermediate category includes the brothels, bars, clubs, massage parlours and other indoor prostitution; outdoor or street prostitution is the lower tier. Furthermore, some students and housewives participate on a part time basis in addition to full time professionals. It is common knowledge that data on prostitution are scant and expert's calculations are 'guesstimates'. Hence, with few exceptions, we assume that prostitution is an equivalent

full-time activity, the magnitude of which we measure, thanks to qualitative and quantitative surveys issued from primary as well as secondary sources.

Box 1. Prices for sex trade and earnings premium

We compiled piecemeal data from 21 EU countries (Czech Rep., France, Luxembourg, Malta, Slovakia, Slovenia, Sweden are missing) from Havoscope Black Market (www.havoscope.com). Prices for street prostitution range from € 13 up to € 63 and € 27 is the average price for twelve countries. Regarding brothels, the range is € 30-67, with an average price of € 45 (eight countries) that stands over one and a half times higher than street prostitution. Escort girls would charge from € 37 up to € 225 in five countries, with an average price of € 125 that stands more than four and a half times as high as street prostitution. Let us assume that these are (net) hourly prices and that prostitutes earn half of the average price, whereas the other half is the pimp’s cut. Hence, we may compare with median gross hourly earnings for EU-27 employees in 2010 (Eurostat [earn_ses_pub2i](#)), namely € 11.8. There is a premium as for earnings from street prostitution (€ 13.5), brothels (€ 22.5) and escorts (€ 62.5).

3.1. The demand side

All studies agree that demand for prostitution comes from men. The issue remains controversial as regards male behaviour. In line with Stuart Mill (1870), abolitionists contend that demand should -and actually can be curbed, whereas Cho et al (2013) assume that demand is inelastic (Malthus, 1798). Hakim (2015) claims that demand is on the rise, due to male sexual deficit in Britain (from two per cent to four per cent of men between 1990 and 2000) and Finland (from ten per cent to 14 per cent between 1992 and 1999).

As for qualitative surveys, a pilot study upon a non-random (small) sample of clients in Denmark (13 interviewees) and Italy (56 interviewees) used control groups and a survey (including 84 respondents in Sweden); it concludes that interviews cannot provide a snapshot of all forms of demand (Anderson and O’Connell Davidson, 2003).

Statistics Denmark (2005) has compiled data regarding the frequency of purchase for prostitution services (25 percent at least once and 28 per cent more than 12 times) and the age groups of customers (46 per cent aged 30-49 and still 18 percent over 60).

In England, Sanders (2008) designed 50 in-depth interviews in 2006, whereas in Scotland Farley et al (2011) used a sample of 110 men in 2008; both studies comprise a strong self-selection bias.

Demand is both domestic and foreign. In Sweden for instance, 80 per cent of men who have paid for sex did so abroad. Demand depends on cultural patterns that encapsulate the social acceptance of prostitution. In Spain, the rate on men who did pay for sex at least once is three times higher than in Finland and Sweden, and amounts to nine per cent in the UK. However, the sample for Spain as well as Finland and the Netherlands is too small a size to be representative.

A first series of quantitative surveys addressed male sexual behaviour with the question ‘did the respondent pay at least once for sex with a prostitute’. Table 1 records data from five EU countries dating back to the 1990s, mostly before the Internet propelled easy access to sex services. Actually, much smaller proportions of men buy sex regularly in the UK and they belong to all socio-economic groups (Ward et al, 2005).

Table 1. Men who brought sex from a prostitute

| Country | Percent of men | Sample size (N) | Year |
|-------------|----------------|-----------------|------|
| Finland | 13 | 624 | 1999 |
| Netherlands | 14 | 392 | 1989 |
| Spain | 39 | 409 | 1992 |
| Sweden | 13 | 1,475 | 1996 |
| UK | 5.6 | 6,678 | 1991 |

| | | | |
|----|-----|-------|------|
| UK | 8.8 | 5,613 | 2000 |
|----|-----|-------|------|

Source: Månsson (2005), Ward et al (2005), Farley et al (2011)

Table 2 records a second series of national surveys on sexual behaviour in Europe that developed between 1990 and 2000 (Hubert et al, 1998; Johnson et al, 2001). It addressed the proportion of men reporting having commercial sex in the past 12 months.

In seven European countries (France, West Germany, Italy, Netherlands, Portugal, Spain and the UK), surveys conducted in the early nineties show large discrepancies in reported contact with a sex worker: 1.1 per cent in France and 11.0 per cent in Spain. The median value was 4.95 per cent, with a mean of 4.1 per cent.

Surveys in the late nineties cover only five countries (France, Germany, Italy, Portugal and the UK) and provide much smaller estimates: The median value was 2.22 per cent, with a mean of 2.65 per cent (Carael et al, 2006). It is worth noticing there is a bias in the early 1990s surveys due to age concentration and small sample size for some countries; hence, one cannot conclude that demand is diminishing. For instance, 3.1 per cent among a sample of 5,540 French males reported having commercial sex in the past five years as for 2006 (Bajos et al, 2007), whereas the proportion was 3.3 per cent in 1992 (Spira et al, 1992).

Table 2. Proportion of men reporting having commercial sex in the past 12 months

| Country | Year | Prevalence of clients of Female Sex Workers | Source |
|----------------|------|---|---------|
| France | 1992 | 1.1% | Natsal* |
| France | 1998 | 0.7% | NEM** |
| Germany (West) | 1990 | 4.8% | Natsal |
| Germany | 1998 | 0.0% | NEM |
| Greece | 1998 | 5.3% | NEM |
| Italy | 1992 | 2.0% | Natsal |
| Italy | 1998 | 1.7% | NEM |
| Netherlands | 1989 | 2.8% | Natsal |
| Portugal | 1991 | 5.4% | Natsal |
| Portugal | 1999 | 2.4% | NEM |
| Spain | 1990 | 11.0% | Natsal |
| UK | 1990 | 2.0% | Natsal |
| UK | 1998 | 1.0% | NEM |

* The sample includes sexually active only for 18–49 years old age group. ** EU New Encounter Module. Source: Carael et al (2006)

We now focus on the analytics of demand in the UK.

Two papers use data from the British National Survey of Sexual attitudes and Lifestyles (Natsal), which was conducted in 1990-1991 and 2000-2001 upon a representative sample of 12,110 clients and non-clients aged 16-44 years old.

Cameron and Collins (2003) estimate a probit model for the choice by heterosexual males of consuming female heterosexual prostitution services upon the 1990-1991 survey. The search cost for single men of finding sexual partners is an important determinant and pricing is a reflection of risk preferences for non-single men; the risk of disease has a significant deterrent effect, while risk disposition and belonging to a sexually restrictive religion have a significantly positive effect.

Della Giusta et al (2014) use the 2000-2001 survey, but restrict their sample to men aged 26-44 years; thus, there is no difference as regards average age between clients and non-clients. According to their probit model including the same variables as in Cameron and Collins (2003), the determinants are very similar albeit educational attainment and skills

seem to run opposite: clients are better educated although more unskilled; clients are less often married or co-habiting than non-clients.

Another two papers design a hedonic price model that captures both the demand side and the supply-side upon data collected from an Internet website.

Moffatt and Peters (2004) use a sample of 998 clients in the whole UK that completed reports submitted between January 1999 and July 2000. They provide evidence that pricing reflects risk preferences and find that sex-workers in the UK earn twice the weekly wage of a typical non-manual female worker.

Muravyev and Talavera (2013) design a matched female prostitutes-clients panel data over 1999-2009 from the same website, with a larger sample (4,569 observations from 1,580 sex-service providers) that is restricted to the London area and with a narrower focus upon unprotected sex. The average age of a service provider is 25 years old, there is a premium (median price per hour is £150) and a client spends on average 48 minutes while Moffatt and Peters (2004) report a lower price and span of time.

The UK may not be representative for EU-28 and we ignore what might be the patterns of sexual behavior across EU countries. What is the share of clients among the 168 million adult male population in EU-28? We return to this issue in the last section of the paper.

3.2. The supply side

Data are less scarce on the supply side.

There are qualitative surveys upon small non-random samples in three EU countries that have regulatory prostitution regimes. Farley et al (2003) interviewed 54 sex workers in Germany. Wagenaar et al (2013) interviewed 82 sex workers in Austria and 44 in the Netherlands; they suggest there are no barriers to entry as for brothels and earnings in prostitution are generally low: hourly gross earnings rarely exceeding €8. Proprietors take usually 40-50 per cent from earnings, prescribe dress codes and working hours and make sex workers pay for various services. Hence, the sex worker would get roughly € 1,000 average monthly net earnings. Adriaenssens and Hendrickx (2015) designed a recent survey addressing the various segments of prostitution from the supply side altogether with a wide range of prices: it claims that the official figures for prostitution in Belgium are underestimated.

An international foundation defending sex workers (TAMPEP, 2007; 2009, 2010) issued a standardised questionnaire among its network. It collected 380 responses from 600 questionnaires sent to key organisations, mostly NGO (56 per cent) and Health Services (22 per cent) in direct contact with sex workers. It helped building up a mapping and reports for 23 EU countries; Croatia, Cyprus, Ireland, Malta and Sweden are missing, whereas Ukraine is included (See Table 3). Some answers regarding earnings suggest that the questions were misunderstood and estimates were not checked. However, country reports provide data on working conditions and vulnerability, mobility and earnings that may be used rather as a qualitative assessment.

As regards location, almost two thirds of sex workers in Europe work indoor (brothels, clubs, bars, parlours, windows and escort). Indoor prostitution makes it less visible, hence more difficult to estimate.

Twelve EU countries wherein the share of migrants among sex workers is above 50 per cent are net importers; the UK is an outlier. Conversely, ten EU countries wherein the share of nationals among sex workers is above 50 per cent are most likely to be exporters. One third of migrants came from EU countries in 2008; Romania (12 per cent), Bulgaria

(8 per cent), Hungary and Poland (4 per cent), Czech Republic, Slovakia, Latvia, Lithuania and Estonia (3 per cent) were most mentioned countries of origin; it is worth adding Ukraine (7 per cent).

In contrast with nationals that account only for 30 per cent of total number of sex workers, migrant sex workers account for almost 70 per cent. The latter are highly mobile and more vulnerable as regards working conditions and risks (including HIV as well as deportation); two thirds are prone to be exploited by third party (pimps and brothel managers) who retains a larger share of earnings. The figures for nationals are opposite: one third is prone to be exploited by third party.

Table 3. Sex workers in the EU according to TAMPEP (2008)

| Country | Nationals (% of prostitutes) | Migrants (% of prostitutes) | Dummy (%) | Outdoor prostitution | Number of prostitutes | year |
|----------------|------------------------------|-----------------------------|---------------|----------------------|-----------------------|------|
| Austria | | 78% | <i>Import</i> | 15% | 27,000-30,000 | 2008 |
| Belgium | | 60% | <i>Import</i> | 34% | 15,000-20,000 | 2008 |
| Bulgaria | 98% | | | 33% | 6,000-10,000 | 2008 |
| <i>Croatia</i> | | | | | | |
| <i>Cyprus</i> | | | | | | |
| Czech Rep | 59% | | | 19 % | 10,000-13,000 | 2008 |
| Denmark | | 65% | <i>Import</i> | 25% | 5,560 | 2008 |
| Estonia | 95% | | | 2% | 1,000-1,200 | 2008 |
| Finland | | 69% | <i>Import</i> | 10% | 5,000-6,000 | 2008 |
| France | | 61% | <i>Import</i> | 61% | 18,000-30,000 | 2008 |
| Germany | | 65% | <i>Import</i> | 13% | 400,000 | 2008 |
| Greece | | 73% | <i>Import</i> | 60% | 10,000 | 2008 |
| Hungary | 75% | | | 40% | 10,000-15,000 | 2008 |
| <i>Ireland</i> | | | | | | |
| Italy | | 90% | <i>Import</i> | 60% | 50,000 | 2008 |
| Latvia | 88% | | | 40% | 2,000-3,000 | 2008 |
| Lithuania | 90% | | | 57% | 1,250-1,550 | 2008 |
| Luxembourg | | 92% | <i>Import</i> | 30% | 5,000 | 2008 |
| <i>Malta</i> | | | | | | |
| Netherlands | | 60% | <i>Import</i> | 11% | 10,000-15,000 | 2008 |
| Poland | 66% | | | 40% | 10,000 | 2008 |
| Portugal | | 56% | <i>Import</i> | 45% | 9,700 | 2008 |
| Romania | 98% | | | 64% | 2,500-3,800 | 2008 |
| Slovakia | 98% | | | 73% | 7,500 | 2008 |
| Slovenia | 70% | | | 2% | 1,500-3,000- | 2008 |
| Spain | | 90% | <i>Import</i> | 46% | 6,000 | 2008 |
| <i>Sweden</i> | | | | | | 2008 |
| UK | | 41% | | 23% | 80,000 | 2008 |
| EU-23 | | | | | 693,000-730,000 | |
| Ukraine | | | <i>Import</i> | | 50,000-83,000 | 2006 |

Source: TAMPEP (2007, 2009, 2010)

Aforementioned data including both nationals and migrants (TAMPEP, 2010) suggest an educated guess. Over one third (36 per cent) of sex workers might be independent from third party (although not from family ties) and can be considered as self-employed, including part-time sex workers. Hence, the majority of sex workers is trapped in forced labour, wherein which migrant sex workers fill in the largest share.

In order to fill in the vacuum for the five missing countries from Table 3 and do justice to other estimates, we picked up the figures from the abolitionist Scelles foundation (Charpenel, 2013) and the UNODC (2014) that are included in Table 4.

It is worth noticing that figures come from miscellaneous sources (NGOs, the police, etc.) and no information is available as regards coverage and time period for data collection. We compiled all estimates whatever sources for 26 EU countries and completed the missing figures for Cyprus and Malta with the median value of the 26 EU countries. We first calculated the highest of the lowest figures for EU-28 and came up with Estimate 1A amounting to 748,000 prostitutes. When calculating the lowest of the highest figures for EU-28, Estimate 1B amounts to 1,310,000 prostitutes, which is 75 per cent higher.

Table 4. High and low Estimates from miscellaneous sources

| Country | Number of adult females (thousand) | Number of prostitutes (circa 2010) | Number of prostitutes (circa 2010) | Estimate 1A: Highest of the lowest | Estimate 1B: Lowest of the highest | Prostitutes as a % of adult females | |
|---------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|-------------------------------------|------|
| | | | | | | 1A | 1B |
| Austria | 2,815.5 | 27,000-30,000 | 5,500-10,000 | 10,000 | 27,000 | 0.54 | 1.46 |
| Belgium | 3,555.9 | 15,000-20,000 | 10,000-15,000 | 15,000 | 20,000 | 0.74 | 1.0 |
| Bulgaria | 2,535.48 | 6,000-10,000 | 8,000-10,000 | 10,000 | 10,000 | 0.7 | 0.7 |
| Croatia | 1,438.29 | | 6,700 | 6,700 | 6,700 | 0.9 | 0.9 |
| <i>Cyprus</i> | 295.125 | | | 915 | 1,446 | 0.55 | 0.79 |
| Czech Rep. | 3,641.35 | 10,000-13,000 | 5,000-25,000 | 13,000 | 25,000 | 0.63 | 1.21 |
| Denmark | 1,800.06 | 5,560 | 5,500 | 5,500 | 5,500 | 0.43 | 0.43 |
| Estonia | 459.12 | 1,000-1,200 | 1,000 | 1,000 | 1,200 | 0.35 | 0.43 |
| Finland | 1,756.75 | 5,000-6,000 | 12,000-15,000 | 6,000 | 15,000 | 0.51 | 1.27 |
| France | 21,197.0 | 18,000-30,000 | 18,000-20,000 | 20,000 | 30,000 | 0.16 | 0.24 |
| Germany | 26,628.5 | 400,000 | 150,000-400,000 | 150,000 | 400,000 | 0.85 | 2.27 |
| Greece | 3,684.2 | 10,000 | 1,200-20,000 | 10,000 | 20,000 | 0.56 | 1.13 |
| Hungary | 3,483.1 | 10,000-15,000 | 8,000-10,000 | 10,000 | 15,000 | 0.58 | 0.87 |
| Ireland | 1,543.8 | | 1,000 | 1,000 | 1,000 | 0.11 | 0.11 |
| Italy | 19,501.4 | 50,000 | 50,000-100,000 | 50,000 | 100,000 | 0.55 | 1.10 |
| Latvia | 743.3 | 2,000-3,000 | 15,000-20,000 | 3,000 | 20,000 | 0.69 | 4.59 |
| Lithuania | 1,102.8 | 1,250-1,550 | | 1,550 | 1,550 | 0.24 | 0.24 |
| Luxembourg | 169.06 | 5,000 | | 5,000 | 5,000 | 5.25 | 5.25 |
| Malta | 141.9 | | | 467 | 467 | 0.84 | 0.84 |
| Netherlands | 5,519.2 | 10,000-15,000 | 20,000-30,000 | 15,000 | 30,000 | 0.39 | 0.79 |
| Poland | 13,561.5 | 10,000 | 12,000 | 10,000 | 12,000 | 0.14 | 0.17 |
| Portugal | 3,590.1 | 9,700 | 28,000 | 9,700 | 28,000 | 0.44 | 1.28 |
| Romania | 6,899.5 | 2,500-3,800 | 2,000-23,000 | 3,800 | 23,000 | 0.10 | 0.63 |
| Slovakia | 1,941.3 | 7,500 | | 7,500 | 7,500 | 0.73 | 0.73 |
| Slovenia | 688.4 | 1,500-3,000- | | 1,500 | 3,000 | 0.14 | 0.69 |
| Spain | 15,653.1 | 6,000 | 300,000-400,000 | 300,000 | 400,000 | 3.64 | 4.85 |
| Sweden | 3,000.7 | | 1,500 | 1,500 | 1,500 | 0.07 | 0.07 |
| UK | 20,769.0 | 58,000-80,000 | 80,000-100,000 | 80,000 | 80,000 | 0.6 | 0.6 |
| <i>EU-28</i> | 168,116.1 | 693,000-730,000 | 740,400-1,253,700 | 747,970 | 1,309,634 | 0.44 | 0.78 |
| Ukraine | 16,739.8 | 50,000-83,000 | 50,000-83,000 | 50,000 | 83,000 | 0.3 | 0.49 |

Source: TAMPEP (2007, 2010); UNODC (2014), Charpenel (2013)

As a share of adult females, prostitution in the EU-28 is well below one percent on average with respect to estimates. As for Estimate 1A, 18 countries are above EU-28 average, whereas for Estimate 1B there are 17 countries –almost the same save the Netherlands.

3.3. Prostitution and HIV prevalence: a tentative estimate

We assume that sex workers are overwhelmingly females (90%); hence, we do not address male and transgender prostitution that nevertheless does exist.

In Table 5, we estimate the number of female sex workers using an indirect measure from HIV prevalence collected from the World Health Organisation. There are two series of data: In the first series, data for 23 EU countries and Ukraine relate either to 2000 or 2004 (Vandepitte et al, 2006); after adjusting for missing data with the median value of HIV prevalence in the EU (0.5 per cent), the number of females sex workers is slightly below one million. In the second series, data for 24 EU countries and Ukraine relate to mid and late 2000s (Prüss-Ustün et al, 2013); after adjusting for missing data with the median value of HIV prevalence in the EU (0.3 per cent), the number of females sex workers shrinks to slightly over half a million.

Table 5. An estimate of female sex workers from HIV prevalence (2011 and early 2000s)

| Country | Female +15 years old (2011) | Female sex workers as a % of females +15 years old (2011) | Estimate 2 Number of female sex workers (2011) | Female sex workers as a % of females + 15 years old (early 2000s) | Number of female sex workers (early 2000s) |
|-----------------|-----------------------------|---|--|---|--|
| Austria | 2 831 855 | 0.5 | 14,16 | 1.0% | 26,944 |
| Belgium | 3 599 767 | 0.2 | 7,2 | 0.4% | 13,545 |
| Bulgaria | 2 500 139 | 0.3 | 7,5 | 0.6% | 15,988 |
| Croatia | 1 438 394 | 0.2 | 2,877 | 0.5% | 7,231 |
| <i>Cyprus</i> | 304 272 | Na (0.3)* | 0,913 | Na (0.5%)* | 1,521 |
| Czech Rep | 3 622 042 | 0.2 | 7,244 | 0.4% | 14,409 |
| Denmark | 1 801 669 | 0.2 | 3,603 | 0.4% | 7,028 |
| Estonia | 455 730 | 0.5 | 2,278 | 1.1% | 5,254 |
| Finland | 1 753 497 | 0.1 | 1,753 | 0.3% | 5,137 |
| France | 20 608 570 | 0.1 | 20,608 | 0.2% | 38,506 |
| Germany | 26 666 646 | 0.7 | 186,666 | 1.4% | 385,266 |
| Greece | 3 676 071 | 0.2 | 7,352 | 0.4% | 14,681 |
| Hungary | 3 472 528 | 0.3 | 10,417 | 0.6% | 21,222 |
| <i>Ireland</i> | 1 539 528 | Na (0.3)* | 4,818 | Na (0.5%)* | 7,697 |
| Italy | 19 567 814 | 0.2 | 39,136 | 0.4 | 7,7283 |
| Latvia | 724 906 | 0.7 | 5,074 | 1.5% | 12,143 |
| Lithuania | 1 063 308 | 0.4 | 4,253 | 0.7% | 8,251 |
| Luxembourg | 172 648 | 0.2 | 0,345 | 0.4% | 0,570 |
| <i>Malta</i> | 141 449 | Na (0.3)* | 0,424 | Na (0.5%)* | 0,707 |
| Netherlands | 5 538 148 | 0.3 | 16,614 | 0.6% | 31,833 |
| Poland | 13 580 266 | 0.3 | 40,741 | 0.6% | 78,751 |
| <i>Portugal</i> | 3 582 038 | Na (0.3)* | 10,746 | Na (0.5%)* | 17,910 |
| Romania | 6 866 235 | 0.4 | 27,465 | 0.8% | 59,305 |
| Slovakia | 1 938 685 | 0.2 | 3,877 | 0.4% | 7,658 |
| Slovenia | 689 707 | 0.7 | 4,828 | 1.4% | 9,671 |
| Spain | 15 637 867 | 0.3 | 46,914 | Na (0.5%)* | 78,189 |
| Sweden | 3 006 611 | 0.05 | 1,503 | 0.1% | 2,799 |
| UK | 20 882 796 | 0.3 | 62,648 | 0.5% | 96,174 |
| EU-28 | 168 316 690 | 0.3* | 541,957 | 0.5%* | 976,118 |

| | | | | | |
|---------|------------|-----|-------|------|--------|
| Ukraine | 16 746 093 | 0.2 | 33492 | 0.4% | 26,944 |
|---------|------------|-----|-------|------|--------|

Source: Prüss-Ustün et al (2013); Vandepitte et al (2006)

* Median value

Comparing these two series, one should not conclude that the magnitude of prostitution has declined, which would run opposite to the trend in demand. It is quite unlikely a serious drop in HIV prevalence occurred during so short a period that would only be due to safer sex practices, an assumption that is not documented. At last, there is no reason to assume that epidemic recording has deteriorated over time. We have yet no strong clue to decide whether the mid-late 2000s series understate the magnitude of sex work, although Prüss-Ustün et al (2013) acknowledge the survey coverage for female sex workers was adjusted for injection drug use and makes it a conservative estimation; conversely, the early 2000s series may overstate the magnitude. The former stands as Estimate 2A and the latter as Estimate 2B.

4. Sexual exploitation trafficking and forced labour in the EU

4.1. Sexual exploitation trafficking, forced labour and prostitution do not overlap

Sexual exploitation trafficking is a subsample of overall prostitution and it has been used to provide indirect measurement of the latter.

Europol (2011), the ILO (2012), Eurostat (2013a) and UNODC (2014) provide fragmented information on the patterns of prostitution and its magnitude in the EU. All these sources assert that trafficking for sexual exploitation is the most common form of human beings trafficking. Data available across countries cover the characteristics of victims and trafficking routes. The main limitation of data is that recording depends on judicial and police effectiveness. Databases do not collect necessarily from the same source: neither UNODC nor Eurostat collect primary sources, whereas Europol does and the ILO collects data from both primary and secondary sources (Vermeulen et al, 2006).

The United Nations Protocol to Prevent, Suppress and Punish Trafficking in Persons, Especially Women and Children, coined as the Palermo Protocol (2000) sets the minimum standards for the elimination of trafficking of human beings in terms of prosecuting traffickers and supporting victims. The United Nations Office on Drugs and Crime (UNODC) is in charge of the implementation and records the victims (UNODC, 2014). The Palermo Protocol entered in force in 2003. It states that exploitation of prostitution and trafficking cannot be separated, albeit it does not apply to non-coercive prostitution. In this connection Tier 1 gathers the 17 EU Member States that fully comply with the minimum standards (Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Poland, Slovakia, Slovenia, Spain, Sweden and the UK). The remaining 11 EU Member States that do not fully comply and belong to Tier 2 (Bulgaria, Croatia, Cyprus, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Portugal and Romania) as well as Ukraine. It is worth noticing that Tier 2 gathers countries from all three-policy regimes as regards prostitution. See Table 6.

In line with the Palermo Protocol, the ILO (2009) designed from experts a list of 67 indicators related to trafficking with respect to recruitment, working conditions and coercion. The subset of indicators for sexual exploitation encapsulates very bad working conditions (including excessive working time and hazardous work), low or no salary (including wage manipulation) and no compliance with labour regulations (including the absence of contract signed and social protection. It leaves room for non-coercive

prostitution (including casual activity) in as much as it is not related to sexual exploitation. In this connection, non-coercive prostitution is similar to undeclared work or informal employment as defined by the ILO (2003).

The ILO (2012) computed a global estimate of forced labour for the 2002- 2011 reference period from a capture-recapture investigation based on reported cases from different sources (research institutes, NGOs and the media). Forced sexual exploitation is mostly affecting women (98%) and the average duration is less than 18 months for commercial sexual exploitation. As for the prevalence of forced labour, the ratio is highest in the Central and South-Eastern Europe and Commonwealth of Independent States regions at 4.2 victims per 1,000 inhabitants respectively, and lowest in the Developed Economies and European Union at 1.5 victims per 1,000 inhabitants.

Box 2. Prostitution and informal employment

Prostitution as any other activity falls within the employment framework designed by the ILO (1993, 2003) in order to compile informal employment. Informal employment gathers employees and self-employed both within the formal and the informal sector (Hussmanns, 2004). Employees are considered informal in as much as their employment relationship is not subject to national labour legislation, income taxation or social protection entitlement. Informal employees may be undeclared, hold casual jobs or jobs with a limited short duration; experience working hours (beyond) or wages (below) a specified threshold; workplace is outside the premises of the employer's business; or jobs for which labour regulations are not applied, not enforced, or not complied with for any other reason. Self-employed in unincorporated enterprises are informal in as much as their job is not registered, escaping both income taxation and social security contribution payment.

The EU countries do not compile informal employment. The absence of a fixed contract may provide a proxy for informal employment; in this connection, it applies to both the employees with a limited duration contract and to self-employed. Sex workers do not usually have a fixed contract ensuring that they benefit from labour and social regulations, although they may have a job in massage parlours or other legal activities. In as much as prostitutes are considered as self-employed workers without fixed contract, regardless they are trapped in (illegal) forced labour or practice (legal) non-coercive sex work, they are informal workers.

With regard to informal employment in the EU-28 for Estimates 1A and 1B, sex workers would amount from 0.77 up to 1.35 per cent of total employed females and from 3.5 up to 6.25 per cent of females without a fixed contract, including self-employment (ILOSTAT).

4.2. Factors and patterns of sexual exploitation trafficking in the EU

According to Europol (2011), there is active rotation of women forced into prostitution. It aims at triggering the demand from clients and exploring new markets, whilst avoiding victims establishing relationships, hence law enforcement detection of trafficking offences. Detection becomes more difficult with the move to semi urban and rural areas and the use of private accommodation for purchased sex activities. Although they are likely to be former victims themselves, female offenders organise the trafficking for sexual exploitation in increasing proportion. Victims of trafficking are recruited with false promises of well-paid jobs or a better life and marriage. The criminal groups operate within family networks and/or ethnic communities that recruit women from the same background; they use widespread contacts in Europe to exploit victims in more than one country, thanks to low cost airlines.

Eurostat (2013a) collected data on human beings trafficking over the period 2008-2010. It is acknowledged that the EU currently lacks reliable and comparable statistical information on trafficking in human beings. This is mainly due to the differences between

the Member States in the criminal codes, in the reporting and monitoring systems as well as for the rates of reporting cases to the police, NGOs and other entities.

In the year 2010, 24 EU Member States reported a total number of 9,528 identified and presumed victims of trafficking, whereas the total number of identified victims is 5,535. Data are broken down between other forms of forced labour and sexual exploitation, which amounts to the largest share of victims (62%) that are predominantly female (96%). Sexual exploitation includes all forms of forced prostitution whether indoor or outdoor. Most victims detected in EU Member States are citizens from Romania and Bulgaria. Suspected traffickers for sexual exploitation represent approximately 84 per cent of the total number of suspected traffickers over the three reference years.

Box 3. Ukraine: a flourishing domestic market and export source for prostitution

The case study of Ukraine is especially interesting. First, it is the largest populated Eastern country that may become a candidate to enter the European Union. Second, despite it stands among the very few countries that prohibit prostitution, Ukraine experiences a large domestic market for prostitution. Last, it is one of the largest export source of prostitution to the EU.

Sex market is segmented, according to information collected from the Internet on corresponding web-sources and from the newspaper articles in late 2015. The price range is €7.5 per hour for street sex workers, whereas “elite” prostitutes earnings top at €30.

According to the UNODC (2015), Ukraine belongs to the Tier 2 Watch List countries: (i) the absolute number of victims of severe forms of trafficking is very significant or is significantly increasing; (ii) there is a failure to provide evidence of increasing efforts to combat severe forms of trafficking in persons from the previous year.

The Ministry of Internal Affairs of Ukraine recorded for 2010 257 277 victims of human trafficking, including 204 women. This figure is slightly below the number of victims of human trafficking in Ukraine for 2010 - 366 among which over four out of five being females (UNAIDS, 2013). On the other hand, the International Organisation of Migrations (IOM, 2014) records a number of 1085 victims of human trafficking for 2010 that is at least three times higher, among which over 36 percent for sexual exploitation.

Although Ukraine ratified all conventions, the implementation of the national policy on combating human trafficking falls short in allocating appropriate resources to conduct investigations, protect victims and prosecute offenders. The criminal verdicts are reached in less than a quarter of cases. The General prosecutor reports only 39 cases (19 females and 20 males), and just 16 individuals were convicted of trafficking in persons in 2010, whereas the number of victims of human trafficking in Ukraine for 2010 is either 277, 366 or 1,085 according to the aforementioned sources (UNAIDS, 2013; IOM, 2014).

UNODC (2014) provides some similar patterns for the period 2010- 2012, focusing on economic gains involved in exploiting people, domestically or abroad. According to the gap with the origin country, the richer the destination country, the higher the profits sexual exploitation can generate, and the more the exploiter is willing to invest for a victim to be exploited there. The price of women depends on the expected profit and the perceived risk associated with carrying out the crime, as well as the demand for sex services in the destination country.

There is a significant and strong positive correlation of GDP per capita for the year 2011 and the share of the victims trafficked from outside of the region of detection. According to the shares of citizenships of foreign victims detected at destination, regional trafficking within the region is over three times higher than transregional trafficking. Geographical aggregation of European countries (here restricted to EU Member States) helps sorting out four sub regions. Western Europe (54.2 percent of EU population) comprises Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, the Netherlands, Sweden

and the UK. Southern Europe (25.3 per cent of EU population) includes Cyprus, Greece, Italy, Malta, Portugal and Spain. Central Europe (14.2 per cent of EU population) gathers the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. The Balkans (6.1 percent of EU population) account for Bulgaria, Croatia and Romania. According to Gravity Models that may explain half of the migration flows, cross-border flows detected in Western and Central Europe is an increasing function of the size of the countries of origin and destination, whereas population mobility is a decreasing function of distance (as the inverse of geographical proximity). Domestic trafficking accounts for about one fourth of the total number of victims detected in Western and Central Europe. Adding up sub-regional cross-border trafficking to domestic trafficking, over six in 10 victims detected in Western and Central Europe are citizens of countries within the sub-region. As for the more affluent countries in Western and Southern Europe, domestic trafficking accounts for 16 per cent of the total number of detected victims, four per cent from Europe cross-border and 40 per cent from Central Europe and the Balkans. In Central Europe and the Balkans, domestic trafficking accounts for about 80 per cent of the detected victims in accordance with previous findings (TAMPEP, 2010). Among the detected victims trafficked to EU countries, sexual exploitation is prevalent (66.25 per cent). Although the EU Member States do reach the worldwide highest score with respect to deterrence, half of suspected offenders is prosecuted and about 30 per cent are convicted in the first instance.

4.3. The magnitude of sexual exploitation in the EU-28

We compared and compiled data for victims of sexual exploitation in 2010 from Eurostat (2013a) and UNODC (2014). Table 6 reports the numbers of victims for 20 EU countries. With regard to consistency, we first checked both series of data for the same 18 EU countries; the data do not match for Spain. We computed the missing data thanks to the average share of victims according to the UNODC series. At last, we completed the series for all 28 EU countries, using Eurostat series when available and UNODC otherwise. It is worth noticing that some large countries such as Italy and Poland did not provide data although they belong to the Tier 1 Palermo Protocol. We calculated the "Number of victims/100000" by dividing "Number of victims of sexual exploitation in 2010" (sixth column) per "Population in 100,000 in 2010" (second column).

In the EU-28, the average number of victims of sexual exploitation is over one (1.16) for a thousand hundred inhabitants in 2010. Bulgaria, Estonia, and Romania are the countries of Central Europe and the Balkans, alongside Cyprus that do not fully comply with the Palermo Protocol and stand above average; such is also the case for Slovenia that is compliant. Fully compliant countries from Western and Southern Europe such as Ireland, Luxembourg, the Netherlands and Spain also stand above average; France is pretty close to average.

According to UNODC (2010) the detection ratio is one in 20 victims of sexual exploitation trafficking and one sex worker in seven would be a trafficking victim⁴. If we use these figures, there would be a flow 100,000 victims for sexual exploitation in the EU 28 in 2010 (5,000 recorded victims times 20) and over 750,000 sex workers. However, UNODC calculates a stock from a flow, ignoring how large is the flow that leaves the market (replacement) or just moves across countries. If net inflow increases, the stock of

⁴ Transcrime (2002) suggests a multiplier of 20 for every victim detected, which comes from a pilot survey tested in Spain, Italy and Finland. The share of victims among sex workers remains unexplained.

prostitutes may be rising over time and this should lower prices, unless there is an increase in demand.

Table 6. Victims of sexual exploitation and prevalence in the EU for year 2010

| EU Member States | Number of inhabitants (100,000) | Compliance with Palermo Protocol | Number of victims: sex exploit. 2010 (Eurostat) | Average number of victims: sex exploit. over period (UNODC) | Number of victims: sex exploit. 2010 (Eurostat or UNODC) | Number of victims: sex exploit. /100,000 inhabitants | Prostitution extrapolated from victims of sex exploit. (x20x7) |
|------------------|---------------------------------|----------------------------------|---|---|--|--|--|
| Austria | 83,751 | Tier 1 | | 49 | 49 | 0.585063 | 6,860 |
| Belgium | 110,006 | Tier 1 | 43 | | 43 | 0.390886 | 6,020 |
| Bulgaria | 73,694 | Tier 2 | 366 | 406 | 366 | 4.966462 | 51,240 |
| Croatia | 42,898 | Tier 2 | 2 | 6 | 4 | 0.093243 | 560 |
| Cyprus | 8,397 | Tier 2 | 24 | 24 | 24 | 2.85799 | 3,360 |
| Czech Rep. | 104,867 | Tier 1 | 3 (15) | 36 | 45 | 0.429114 | 6,300 |
| Denmark | 55,606 | Tier 1 | 50 | 70 | 50 | 0.899179 | 7,000 |
| Estonia | 13,296 | Tier 2 | | 16 | 20 | 1.504144 | 2,800 |
| Finland | 53,752 | Tier 1 | 26 | 20 | 26 | 0.483696 | 3,640 |
| France | 649,787 | Tier 1 | 726 | 702 | 726 | 1.117289 | 101,640 |
| Germany | 817,516 | Tier 1 | 610 | 419 | 610 | 0.746163 | 85,400 |
| Greece | 111,233 | Tier 2 | | 69 | 71 | 0.638295 | 9,940 |
| Hungary | 99,857 | Tier 2 | 5 | 68 | 48 | 0.480686 | 6,720 |
| Ireland | 45,708 | Tier 1 | 56 | 44 | 56 | 1.225147 | 7,840 |
| Italy | 593,646 | Tier 1 | | 61 | 57 | 0.096017 | 7,980 |
| Latvia | 20,746 | Tier 2 | 4 | 4 | 4 | 0.192808 | 560 |
| Lithuania | 30,525 | Tier 2 | | 15 | 13 | 0.425868 | 1,820 |
| Luxembourg | 5,118 | Tier 1 | 6 | | 6 | 1.172241 | 840 |
| Malta | 4,149 | Tier 2 | 4 | | 4 | 0.963881 | 560 |
| Netherlands | 166,558 | Tier 1 | 749 | 900 | 749 | 4.496932 | 104,860 |
| Poland | 380,622 | Tier 1 | | 169 | 169 | 0.444004 | 23,660 |
| Portugal | 105,727 | Tier 2 | | 10 | 17 | 0.160791 | 2,380 |
| Romania | 201,990 | Tier 2 | 482 | 520 | 482 | 2.38625 | 67,480 |
| Slovakia | 53,924 | Tier 1 | 21 | 13 | 21 | 0.389434 | 2,940 |
| Slovenia | 20,501 | Tier 1 | 30 | 22 | 30 | 1.46328 | 4,200 |
| Spain | 466,671 | Tier 1 | 1605 | 207 | 1,605 | 3.439248 | 224,700 |
| Sweden | 9,41557 | Tier 1 | 19 | 34 | 19 | 0.201793 | 2,660 |
| UK | 630,225 | Tier 1 | 170 | 173 | 170 | 0.269745 | 23,800 |
| EU-28 | 5,044,944 | | 4,98 | 4,057 | 5,484 | 1.161416 | 767,760 |
| Ukraine | 455,98 | Tier 2 WL | | 234 | 234 | 0.511151 | 32,760 |

Source: our compilation from Eurostat (2013a) and UNODC (2014).

We apply the multiplier (times 20 times seven) to the number of victims of sexual exploitation in each country and extrapolate the magnitude of prostitution (see last column in table): we come up with an overall figure of 767,760 prostitutes for EU-28, which is our Estimate 3. Some results are obviously absurd as regards country

distribution: for instance, Germany counts less prostitutes than the Netherlands albeit five times larger a population. Hence, one may be very skeptical as for the accuracy of such a proxy to gauge prostitution at country level (Savona and Stefanizzi, 2007).

5. Testing the estimates of prostitution

Our OLS regressions are based on cross-section data for 28 and 29 countries (EU-28 plus Ukraine), referring to the year 2010.

We test the following model:

$$y_i = \alpha + \beta_1 Prostitution_i + \beta_2 X_i + \beta_3 Sub-regions_i + \varepsilon_i$$

where y_i represents the various estimates for sex work in country i : Estimates 1A and 1B from miscellaneous sources, Estimate 2 from HIV prevalence and Estimate 3 for reported number of victims of sexual exploitation. $Prostitution_i$ is our dummy variable indicating whether prostitution is legal or not. X is the vector of explanatory variables, $Sub-regions_i$ is a dummy variable for regional patterns and ε_i is the error term (See table 9 in appendix). We inspired from Cho et al. (2013) as well as Jakobsson and Kotsadam (2013) for the variable $Prostitution_i$. We test both legal status for prostitution and for brothels in country i , by testing two dummy variables. First, whether prostitution is legal or not, being 1 in this case and 0 otherwise; second, whether or not third-party involvement (such as brothel manager or pimp) is legal, being 1 in the case that brothels are legal and 0 otherwise. In both cases, the sign is expected to be positive.

We impute a number of *explanatory country* variables X_i^5 . *GDP per capita* takes into account the level of economic development that should influence the presence of a high number of sex workers. We include *Total adult population* to take into account the scale effect and we disentangle *Adult female population* on the supply-side from *Adult male population* on the demand-side. Focusing on the supply side, *International female migrant stock per 100 thousand of population* takes into account the importance of female migration in Western and Southern European countries; its sign is expected to be positive. *Unemployment rate of females younger than 25 years* tackles the assumption that the higher is unemployment, the more women may become sex workers; its sign is expected to be negative. *Rate of female part-time workers* tackles the assumption that prostitution may be a part-time job; its sign is expected to be negative. *Control of corruption* and *Tier* are, respectively, the indicators for countries government effectiveness and compliance with the Palermo protocol. Regarding $Sub-region_i$, the divide between rich Western and Southern Europe and poorer other countries from Eastern Europe (including the Balkans) is designed to catch the imbalance between net sex importers and net sex exporters.

As we use a cross-section dataset, we cannot control for unobserved country heterogeneity by including country fixed effects.

Our sample comprises two series: one for EU-28 and the other one includes Ukraine (29 countries).

The variables *Legal prostitution* and *Legal brothels*, *Adult female population* and *Adult male population* as well as *Total adult population*, *Control of corruption* and *Tier* were tested separately to avoid multicollinearity. All continuous variables were taken in logarithms.

⁵ In order to design the best models we run numerous regressions with several different variables such as the size of households, urbanisation, Internet use, earnings, educational attainment, status in employment and rate of activity for females. In addition, we used ordered probit models to check the ranking of countries, which changes according to estimates. All regressions and probit models are available upon request.

Eventually, we dropped *Control of corruption* and *Tier* and well as *Sub-region_i*, which were relevant only for Estimate 3 and proved insignificant.

We ranked Estimates according to correlation coefficient and the number of significant variables. Our ranking is as follows: Estimates 2A, 2B, 1A, 1B and 3.

The results of the series for EU-28 are recorded in Table 7a we comment hereafter.

GDP per capita is it only significant but negative for Estimates 2A and 2B, as well as for Estimate 3, which may run against the intuition that higher GDP should attract more prostitutes (especially migrants).

As for all Estimates, *Adult female population* on the supply-side is always very significant (p-value is 0.1) and positive, making sure that prostitutes are women.

As for almost all models in Estimates 2A and 2B as well as 1B and 3, *legal brothels* is significant (p-value is 0.1 or at least 0.05); it proves always positive, in line with the results of existing literature (Cho et al, 2013; Jakobsson and Kotsadam, 2013). However, it is not the case for Estimate 1A, wherein which *legal prostitution* is significant (p-value is 0.05) and positive.

International female migrant stock per 100,000 of population is significant (p-value is 0.1 or at least 0.05) for all models in Estimates 2A and 2B; it is positive in all Estimates save Estimate 3.

Unemployment rate of females below 25 is very significant (p-value is 1%) for all models in Estimates 2A and 2B; it proves negative in all Estimates, suggesting that unemployment does not drive prostitution.

Rate of female part-time workers is weakly significant (p value is 0.01) and negative in all Estimates save Estimate 3, suggesting that prostitution is a full-time job.

As for all Estimates, *Adult male population* on the demand-side is always very significant (p-value is 0.1) and positive, making sure that customers are men.

As for all Estimates, *Total adult population* is always very significant (p-value is 0.1) and positive, taking into account the scale effect in line with the results of Cho et al (2013).

The results of the series for EU-28 plus Ukraine (29 countries) are recorded in Table 7b. Our comments are quite similar to those for EU-28. Hence, Ukraine is not an outlier.

GDP per capita is weakly significant for Estimate 2A (p-value is 0.01) and negative as for all models in all Estimates, which may run against the intuition that higher GDP should attract more prostitutes (especially migrants).

As for all Estimates, *Adult female population* on the supply-side is always very significant (p-value is 0.1) and positive, making sure that prostitutes are women.

Only for Estimate 3, *legal brothels* is significant (p-value is 0.05) and positive, in line with the results of existing literature (Cho et al, 2013; Jakobsson and Kotsadam, 2013).

Legal prostitution is weakly significant (p-value is 0.01) and positive for Estimates 2A and 2B as well as 1A.

International female migrant stock per 100,000 of population is only significant or weakly significant for Estimates 1A and 1B (p-value is 0.01 and 0.05) and is positive; it only proves negative for Estimate 3.

Unemployment rate of females below 25 is only significant (p value is 0.05) and positive for all models in Estimate 1B, it is positive in Estimate 1A and negative in Estimates 2A and 2B, suggesting that unemployment may drive prostitution.

For all Estimates, *Adult male population* on the demand-side is always very significant (p-value is 0.1) and positive, making sure that customers are men.

As for all Estimates, *Total adult population* is always very significant (p-value is 0.1) and positive, taking into account the scale effect in line with the results of Cho et al (2013).

Table 7a. Testing the estimates with the OLS models

| Variables | Estimate 2A | | | Estimate 2B | | | Estimate 1A | | | Estimate 1B | | |
|--------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|-------------------------|---------------------|---------------------|--------------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (1) | (2) | (3) | (1) | (2) | (3) | (1) | (2) | (3) |
| | lnumb_femsexwork | | | lnumb_femsexwork2 | | | lnumb_prost_highflowest | | | lnumb_prost_lowofhighest | | |
| lgdp_pc_eu | -0.849*** (0.191) | -1.008*** (0.168) | -0.864*** (0.192) | -1.061*** (0.174) | -0.973*** (0.193) | -0.958*** (0.191) | 0.369 (0.444) | 0.336 (0.443) | 0.353 (0.445) | 0.087 (0.588) | 0.054 (0.588) | 0.071 (0.588) |
| lpop_fem15_64_hund | 1.032*** (0.069) | | | 0.986*** (0.069) | | | 0.877*** (0.142) | | | 0.903*** (0.141) | | |
| leg_broth | 0.571** (0.203) | | 0.565** (0.203) | 0.541*** (0.172) | 0.575*** (0.197) | 0.581*** (0.196) | 0.742 (0.544) | 0.725 (0.536) | 0.732 (0.540) | 1.109** (0.481) | 1.095** (0.474) | 1.101** (0.477) |
| leg_prost | | 0.545 (0.328) | | 0.507* (0.287) | | | 0.731** (0.340) | 0.742** (0.335) | 0.739** (0.338) | 0.823* (0.459) | 0.836* (0.458) | 0.832* (0.458) |
| labs_mig_fem_100th | 0.412*** (0.142) | 0.513*** (0.151) | 0.425*** (0.146) | 0.394*** (0.134) | 0.419*** (0.143) | 0.406*** (0.140) | 0.188 (0.243) | 0.216 (0.241) | 0.202 (0.242) | 0.207 (0.347) | 0.234 (0.348) | 0.221 (0.348) |
| unemp_less25_fem | -0.038*** (0.009) | -0.039*** (0.012) | -0.038*** (0.009) | -0.035*** (0.009) | -0.036*** (0.010) | -0.036*** (0.010) | -0.000 (0.024) | -0.000 (0.024) | -0.000 (0.024) | -0.010 (0.022) | -0.010 (0.022) | -0.010 (0.022) |
| rate_fem_part_time | -0.006 (0.008) | -0.003 (0.006) | -0.006 (0.008) | -0.001 (0.006) | -0.004 (0.008) | -0.004 (0.008) | -0.024* (0.012) | -0.024* (0.012) | -0.024* (0.012) | -0.025* (0.012) | -0.025* (0.012) | -0.025* (0.012) |
| lpop_mal15_64_hund | | 1.062*** (0.077) | | | 1.020*** (0.071) | | | 0.884*** (0.141) | | | 0.907*** (0.140) | |
| lpop_tot15_64_hund | | | 1.034*** (0.069) | | | 1.019*** (0.072) | | | 0.881*** (0.142) | | | 0.906*** (0.141) |
| Constant | 11.357*** (1.580) | 11.602*** (1.810) | 10.677*** (1.584) | 13.812*** (1.937) | 13.132*** (1.604) | 12.386*** (1.642) | 0.626 (3.632) | 0.716 (3.610) | 0.050 (3.618) | 3.754 (3.843) | 3.856 (3.833) | 3.166 (3.829) |
| Observations | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| R-squared | 0.931 | 0.931 | 0.930 | 0.947 | 0.931 | 0.932 | 0.812 | 0.816 | 0.814 | 0.790 | 0.792 | 0.791 |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7a. Testing the estimates with the OLS models

| Variables | Estimate 3 | | |
|--------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) |
| | | lprost_extrapol | |
| lgdp_pc_eu | -0.115 (0.451) | -0.134 (0.447) | -0.125 (0.449) |
| lpop_fem15_64_hund | 0.572*** (0.182) | | |
| leg_broth | 1.327** (0.602) | 1.322** (0.599) | 1.324** (0.601) |
| leg_prost | 0.671 (0.432) | 0.681 (0.436) | 0.677 (0.434) |
| labs_mig_fem_100th | -0.635* (0.343) | -0.622* (0.345) | -0.628* (0.344) |
| unemp_less25_fem | | | |
| rate_fem_part_time | 0.021* (0.011) | 0.021* (0.011) | 0.021* (0.011) |
| lpop_mal15_64_hund | | 0.571*** (0.183) | |
| lpop_tot15_64_hund | | | 0.572*** (0.183) |
| Constant | 12.191*** (3.995) | 12.276*** (3.965) | 11.831*** (4.049) |
| Observations | 28 | 28 | 28 |
| R-squared | 0.747 | 0.746 | 0.746 |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7b. Testing the estimates with the OLS models.

| Variables | Estimate 2A | | | Estimate 2B | | | Estimate 1A | | | Estimate 1B | | |
|--------------------|------------------|----------|----------|-------------------|-----------|-----------|--------------------------|----------|----------|--------------------------|----------|----------|
| | (1) | (2) | (3) | (1) | (2) | (3) | (1) | (2) | (3) | (1) | (2) | (3) |
| | lnumb_femsexwork | | | lnumb_femsexwork2 | | | lnumb_prost_highoflowest | | | lnumb_prost_lowofhighest | | |
| lgdp_pc_eu | -0.463* | -0.517* | -0.489* | -0.398 | -0.444 | -0.420 | -0.174 | -0.224 | -0.198 | -0.359 | -0.409 | -0.383 |
| | (0.257) | (0.254) | (0.255) | (0.299) | (0.298) | (0.298) | (0.275) | (0.279) | (0.277) | (0.321) | (0.323) | (0.322) |
| lpop_fem15_64_hund | 0.920*** | | | 0.798*** | | | 0.866*** | | | 0.858*** | | |
| | (0.088) | | | (0.099) | | | (0.115) | | | (0.113) | | |
| leg_broth | | | | 0.703** | 0.683** | 0.693** | 0.642 | 0.624 | 0.632 | 0.252 | 0.286 | 0.269 |
| | | | | (0.315) | (0.308) | (0.312) | (0.469) | (0.459) | (0.464) | (0.235) | (0.236) | (0.236) |
| leg_prost | 0.694* | 0.703* | 0.701* | 0.687* | 0.701* | 0.694* | 0.799* | 0.810* | 0.807* | -0.002 | -0.003 | -0.003 |
| | (0.351) | (0.355) | (0.353) | (0.348) | (0.305) | (0.349) | (0.395) | (0.395) | (0.395) | (0.016) | (0.016) | (0.016) |
| labs_mig_fem_100th | 0.139 | 0.173 | 0.156 | -0.057 | -0.024 | -0.042 | 0.308* | 0.342** | 0.325* | 0.926* | 0.937* | 0.934* |
| | (0.202) | (0.200) | (0.201) | (0.235) | (0.235) | (0.235) | (0.164) | (0.164) | (0.163) | (0.499) | (0.500) | (0.499) |
| unemp_less25_fem | -0.016 | -0.016 | -0.016 | 0.007 | 0.007 | 0.007 | 0.002 | 0.002 | 0.002 | 1.035** | 1.018** | 1.026** |
| | (0.014) | (0.013) | (0.014) | (0.017) | (0.016) | (0.017) | (0.018) | (0.018) | (0.018) | (0.439) | (0.431) | (0.435) |
| rate_fem_part_time | | | | | | | | | | | | |
| lpop_mal15_64_hund | | 0.925*** | | | 0.806*** | | | 0.873*** | | | 0.864*** | |
| | | (0.085) | | | (0.097) | | | (0.115) | | | (0.114) | |
| lpop_tot15_64_hund | | | 0.923*** | | | 0.802*** | | | 0.870*** | | | 0.862*** |
| | | | (0.087) | | | (0.098) | | | (0.116) | | | (0.114) |
| Constant | 9.032*** | 9.281*** | 8.501*** | 10.756*** | 10.919*** | 10.279*** | 4.398 | 4.603 | 3.882 | 7.127** | 7.338** | 6.620** |
| | (1.921) | (1.906) | (1.915) | (2.051) | (2.053) | (2.044) | (2.884) | (2.887) | (2.888) | (2.852) | (2.864) | (2.859) |
| Observations | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 |
| R-squared | 0.889 | 0.893 | 0.891 | 0.878 | 0.882 | 0.880 | 0.787 | 0.790 | 0.788 | 0.771 | 0.772 | 0.772 |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7b. Testing the estimates with the OLS models

| Variables | Estimate 3 | | |
|--------------------|---------------------|----------------------|---------------------|
| | (1) | (2) | (3) |
| | | lprost_extrapol | |
| lgdp_pc_eu | 0.000 (0.286) | -0.038 (0.286) | -0.019 (0.286) |
| lpop_fem15_64_hund | 0.698*** (0.144) | | |
| leg_broth | 1.310** (0.628) | 1.301** (0.625) | 1.304** (0.626) |
| leg_prost | 0.437 (0.456) | 0.445 (0.461) | 0.443 (0.458) |
| labs_mig_fem_100th | -0.468 (0.290) | -0.443 (0.294) | -0.455 (0.292) |
| unemp_less25_fem | | | |
| rate_fem_part_time | | | |
| lpop_mal15_64_hund | | 0.699*** (0.146) | |
| lpop_tot15_64_hund | | | 0.699*** (0.145) |
| Constant | 9.955*** (3.038) | 10.130*** (3.019) | 9.547*** (3.090) |
| Observations | 29 | 29 | 29 |
| R-squared | 0.715 | 0.713 | 0.714 |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

6. Prostitution and National Accounts adjustment: a GDP enhancement?

6.1. The Non Observed Economy (NOE) and illegal prostitution

In search for exhaustiveness dating back to SNA 1993 and ESA 1995 (Eurostat, 2013b), the definition and measurement of the Non Observed Economy (NOE) was codified in the early 2000s under the aegis of the OECD (2003) and with the support of the ILO. Eurostat (2005) developed a new typology of NOE that is consistent with the standards of National Accounts in terms of coverage and computation of the value added. It includes seven components (N1 to N7), which can be aggregated for purpose of parsimony into four or five categories of unrecorded activities (Gyomai and Van de Ven, 2014).

Illegal production (N2) gathers all prohibited activities that are neither registered nor licensed; it encapsulates illegal prostitution as well as trafficking drug and smuggled or regulated goods (tobacco, alcohol, firearms, etc.).

Underground production (N1 + N6) covers the non-prohibited activities of both registered and unregistered businesses, which hide out to escape tax and social security duties. This includes legal prostitution that misreports income.

Households production for own account (N3) addresses not recorded activity such as imputed rentals and agriculture; it can be added to the next category.

Informal production includes the non-prohibited activities of both households and businesses that are not covered or registered (N4 + N5).

The missing production or statistical deficiency (N7), or so-called underground production for statistical reasons, gathers activities not included in the above categories.

In 2012, the OECD surveyed a sample of 17 EU countries among which 12 countries provided an estimate of NOE. In a previous survey dating back to 2006 (Adair, 2012) eight of the EU countries were already included in the sample (See table 10 in appendix). There are discrepancies across countries that provide estimates for illegal production and especially prostitution, due to lack of coverage as well as poor computation of the related value added, Austria and the Czech Republic standing as the two exceptions. Adjustments are significantly disparate: illegal production is not explicitly addressed either in France, because it is already included in prior GDP adjustments, or in the UK, because it is not compiled in this survey.

Box 4. Compiling estimates for illegal prostitution in various countries

Austria provides an estimate for illegal prostitution as follows: the number of illegal prostitutes times average turnover minus intermediate consumption. The Czech Republic provides data on the various segments of the sex market (prostitution in clubs, private prostitution and street prostitution) from police reports, hygiene stations and an NGO; the estimate is computed as follows: the prostitutes' number times number of contacts in year times average price minus intermediate consumption. Hungary does not provide an estimate for prostitution alone; it is encapsulated within the overall illegal production (N2). Poland also provides data on prostitution in clubs, private prostitution and street prostitution from police reports, the media and an NGO; the estimate is computed as follows: the number of prostitutes times number of contacts in year times average price; in as much as intermediate consumption is not computed, there is no estimate for value added. Slovakia provides an estimate for prostitution from expert calculations and surveys. Slovenia provides an estimate (considered poor) for the number of prostitutes based on expert and police calculations. In Sweden, estimates dating back to 2003 come from interviews and cover the number of workers and turnover; in the absence of computed prices, the consumer price index is used but there is no estimate for the value added of prostitution. Similarly, in the UK there is no explicit estimate either for prostitution or for N2, excepted for smuggled goods.

It is worth noticing that the most populated EU countries that also account for two thirds of the overall value added, did not estimate illegal prostitution. However, the implementation of the updated version of the European System of Accounts -ESA 2010 (Eurostat, 2013b) brings in some improvement.

6.2. Prostitution and GDP adjustment according to ESA 2010

By September 2014, all Member States adjusted their National Accounts to ESA 2010 as for data used to estimate European indicators, in order to ensure comparability. In this connection, member States were requested to compile illegal production (N2). The core issue is not that the inclusion of illegal production in the GDP count is morally unacceptable, but that calculating the illegal economy in itself is prone to inaccuracies due to coverage. Table 8 records the figures for N2 as well as the share of prostitution from the supply side and the

Table 8. Illegal production and prostitution

| EU Member States | 2010 GDP (€ billion) | N2 as % of 2010 GDP | Prostitution from the supply-side | | Prostitution from the demand side (Expenditure) | |
|--------------------|----------------------|------------------------|---|---------------|--|--------------|
| | | | As % of GDP | € million | As % of GDP | € million |
| Austria | 284 | 0.16% | 0.08% | 225 | 0.179% | 508,5 |
| Belgium | 353 | 0.37% | 0.09% | 317,7 | Nc* | Nc |
| Bulgaria | 36 | 0.21%, | 0.09% | 32,4 | 0.044% | 16,0 |
| Croatia | 46 | 0.7% | 0.27% | 124,2 | Nc | Nc |
| Cyprus | 17 | 1.09% | 0.31% | 52,7 | 0.33% | 56,2 |
| Czech Rep. | 145 | 0.53% | 0.09% | 130,5 | 0.177% | 257,9 |
| Denmark | 234 | 0.14% | 0.05% | 11,7 | Nc | Nc |
| Estonia | 15 | 0.52% | 0.03% | 4,1 | 0.027% | 4,1 |
| Finland | 180 | 0.1% | 0.03% | 54 | 0.053% | 96,0 |
| <i>France</i> | 1,933 | Nc | Nc | Nc | Nc | Nc |
| Germany | 2,499 | 0.1% | Nc | Nc | Nc | Nc |
| <i>Greece</i> | 230 | Na | Na** | Na | 0.19% | 437,0 |
| Hungary | 98 | 0.85% | 0,49% | 480,2 | 0.641% | 628,6 |
| Ireland | 156 | 0.73% | 0.036% | 56,16 | 0.038% | 59,5 |
| Italy | 1,549 | 1% | 0.22% | 3407,8 | Nc | Nc |
| Latvia | 18 | 0.9% | 0.088% | 15,84 | 0.103% | 18,6 |
| <i>Lithuania</i> | 27 | Na | Na | Na | 0.107% | 29 |
| Luxembourg | 42 | 0.23% | 0.21% | 88,2 | 0.192% | 81 |
| Malta | 6 | 0.3% | 0.14% | 9 | Nc | Nc |
| Netherlands | 591 | 0.38% | 0.085% | 502,35 | 0.192% | 1139 |
| Poland | 354 | 0.81% | 0.21% | 74,34 | Nc | Nc |
| Portugal | 173 | 0.35% | 0.29% | 501,7 | 0.367% | 635,4 |
| Romania | 122 | 0.46% | 0.06% | 73,2 | 0.071% | 86,7 |
| <i>Slovakia</i> | 66 | Na | Na | Na | 0.074% | 49 |
| Slovenia | 36 | 0,36% | 0.13% | 46,8 | 0.225% | 81,3 |
| Spain | 1,063 | 0.87% | 0.35% | 3720,5 | Nc | Nc |
| Sweden | 347 | 0,14% | 0.017% | 58,99 | 0.017% | 58,8 |
| UK | 1,697 | 0.58% | 0.35% | 5939,5 | 0.383% | 6504,7 |
| EU-28 | 12,314 | 0.483% (€ 59.476,6) | 0.178% (mean 23 countries: 61.4% of EU-28 GDP) | (€ 21.918,92) | 0.18% (mean 19 countries: 35% of EU-28 GDP) | (€ 22.165,2) |

Source: Brennan (2014), Casey (2014), Eurostat, FSO (2014), INE (2014), NAI (2014), Walton (2014). We checked figures with most the National Accounts division of EU-28 Statistics Offices

* Not compiled. ** Not available

As for the revision of National Accounts, N2 coverage is focused on narcotics, prostitution and smuggling alcohol and tobacco. However, some countries extend the coverage to piracy and illegal gambling. On the one hand, an abolitionist country such as France is reluctant to include prostitution in the GDP, arguing on moral grounds that it is not a voluntary exchange, although prostitution is already included to some extent. On the other hand, Germany wherein prostitution is regulated does not bother to include illegal prostitution, arguing that sex work is legal, although some evidence from Estimate 1B suggests that the number of illegal sex workers may supersede the legal ones.

The overall contribution of illegal activities to the EU-28 GDP comes from the countries that did not account so far for these activities; hence, it does not account for all illegal activities encapsulated within N2, especially prostitution. According to Dunn et al. (2014), upwards adjustment amounts to 0.4 per cent of EU-28 GDP, which may be a proxy for N2, whereas it is only 0.2 percent for EU GDP as for OECD countries (Van de Ven, 2015).

We compiled estimates for N2 and for prostitution from the supply side as of 23 EU Member States, which account for a 61.4 per cent share of EU-28 GDP in 2010; unfortunately, five countries (France, Germany, Greece, Lithuania and Slovakia) are missing in the sample. With such piecemeal data, we calculated that N2 could amount to 0.48 percent of EU-28 GDP in 2010, whereas prostitution could amount for almost 0.18 per cent of EU-28 GDP in 2010. Coverage for prostitution from the demand side is recorded in Eurostat nama files as CP122 in the households' final consumption expenditure by consumption purpose (COICOP) for 19 EU countries in 2010: prostitution could amount for 0.18 per cent of EU-28 GDP in 2010. Unfortunately, nine missing countries account for almost two-thirds (65 per cent) of EU-28 GDP in 2010.

6.3. Back to supply and demand for assessing estimates

We inspire from Kazemier et al (2013) to estimate prostitution as a whole, in as much as there are no available country data to compile the various segments of prostitution whether indoor (illegal vs. legal brothels, clubs, escorts and home prostitution) or outdoor (street prostitution).

The turnover of the prostitution industry (P) or receipt is the product of the number of prostitutes (sw), the number of customers per prostitute ($cust$) and the average price per client (p): $P = sw \times cust \times p$

We assume that the average prices per client is € 50; the number of clients is 20 a week, and there are 43 working weeks a year⁶.

Turnover encapsulates domestic consumption (C) and exports (E), sexual services to customers from abroad: $P = C + E$

The value added (VA) of the prostitution industry is the sum of the domestic consumption (C) and exports minus imports (M) minus intermediate consumption (IC). Imports are the sexual services provided by foreign prostitutes resident in the country plus the consumption of sexual services brought abroad by residents. Intermediate consumption are the expenses of the prostitutes themselves (clothing, condoms and travel expenses) we assume to be 20 percent of turnover: $VA = C + E - M - IC$

Gross earnings of the prostitutes is the turnover or receipt minus intermediate consumption, namely the value added (VA). Net earnings or income (NI) is gross earnings

⁶ Abramsky & Drew (2014) estimate the number of clients seen by each prostitute per week as 20, 25 and 30 (four to six clients a day) in the UK. Kazemier et al (2013) assume that prostitutes work 40 weeks per year in the Netherlands.

minus the share of the managers or pimps (the rent, rooms and brothels). We assume that prostitutes pay half the value added (VA) to the managers or pimps: $NI = (0.5) VA$.

Using the 0.178 per cent mean share of prostitution in GDP, overall share in EU-28 GDP would amount to € 21.919 billion. Gross sales turnover (including intermediate consumption for 20 per cent) would then reach € 26.302,8 billion.

We assume that prostitutes have 20 customers a week during at least 43 weeks a year, making an average number of 860 clients per prostitute. Dividing € 26.302,8 billion Gross sales turnover by this average number of clients times the € 50 average price; we come up with 611,693 prostitutes. If € 40 were the average price per client, the number of prostitutes would reach 764,616.

If we divide € 26.302,8 billion Gross sales turnover by 611,693 prostitutes, each prostitute would earn € 43,000 per year from 860 clients, at an average price of € 50. A lower average price of € 40 per client would require an increase in the number of clients.

If we divide € 26.302,8 billion Gross sales turnover by 764,616 prostitutes, each prostitute would earn € 34,400 per year from 860 clients, at an average price of € 40.

We assume that the pimp retains 50 per cent of total earnings (TAMPEP, 2010; Kazemier et al, 2013)⁷. In so far there are 611,693 prostitutes; each prostitute would get average net earnings of € 21,500 per year and €1,791 per month. In as much there are 764,616 prostitutes, each prostitute would get average net earnings of € 17,200 per year and €1,433 per month. In both cases, net earnings are above minimum wages as well as above mean annual earnings for all 10 countries of Eastern and Central Europe as well as for Cyprus, Malta and Portugal (Eurostat_earnings); hence, there is a premium for prostitution as well as for migration.

On the demand side, dividing € 22.165,2 billion total expenditure spent on prostitution by the € 50 average price for sexual services, we come up with 443.3 million sexual services or clients out of 168 million adult male EU population. A crude assumption would be that 5 per cent of EU adult males purchase sexual services every week on average. Perhaps, the € 50 price is too high an average for EU-28, especially for Eastern Europe and some Southern countries. An alternative calculus based on a € 40 average price would only increase the number of clients up to 554.1 million sexual services or clients. According to the same crude assumption, over 6 per cent of EU adult males would purchase sexual services every week on average.

We assume again that prostitutes have 20 customers a week during at least 43 weeks a year that amounts to an average of 860 clients per prostitute at an average price of € 50 for sexual service. Dividing € 22.165,2 billion total expenditure by this average number of clients, we come up with 515,470 prostitutes. As for an average price of € 40 per client, the number of prostitutes would reach 644,340.

What might be the most likely guesstimates?

Adjusted National Accounts may not capture the full magnitude of prostitution, whereas assumptions regarding both customers and prices are disputable. At best, we can assess a few plausible figures for prostitution in the EU-28 as follows. Estimate 2A (542,000 prostitutes) is consistent with National Accounts, in as much as it stands within the range of 515,470-611,693 prostitutes with respect to the demand side and the supply side. This Estimate is likely to be a lower bound for prostitution in the EU-28 as of 2010.

⁷ As we ignore the share of independent prostitution (see above 3.2), we assume that all prostitutes are subjected to pimps, which is not the case. Net earnings could be higher if pimps only retain a 40 per cent share.

Estimate 1A (748,000 prostitutes) is consistent with National Accounts, in as much as it stands within the range of 644,340-764,616 prostitutes with respect to the demand side and the supply side; it is likely to be a median bound for prostitution in the EU-28 as of 2010, although it is less consistent and robust. Estimate 3 (768,000 prostitutes) stands outside the aforementioned range, lacking both robustness and consistency. Estimate 2B (976,118) stands far away outside the aforementioned range, although it is quite robust an estimate and is likely to be a (very high) upper bound. Estimate 1B (1,310,000 prostitutes) is not the upper bound for prostitution in the EU-28 as of 2010; otherwise, it would imply the National Accounts underestimate prostitution by factor 2.4, which seems quite unlikely.

Conclusion

Data sources on prostitution are scant and rather inconsistent, especially as regards country distribution. To our best knowledge, the five EU-28 estimates we have compiled are the first ones in the economic literature on prostitution. Our purpose was to test these estimates in order to design a benchmark for the EU-28 in 2010, according to some reasonable assumptions. The OLS tests suggest that Estimate 2A and 2B (HIV prevalence), Estimate 1A (highest of the lowest) and Estimate 1B (lowest of the highest) are robust according to ranking order. Although we made best use of data provided by Eurostat and the UNODC, Estimate 3 (victims of sexual exploitation trafficking) is the least robust and a loose proxy for illegal prostitution, due to the bias in recording across countries. With regard to the distribution of population across countries, Estimates 2A and 2B are similar and most reliable, whereas Estimates 1A and 1B as well as Estimate 3 are less reliable. We crosschecked these estimates with data from National Accounts in order to avoid major inconsistencies: Estimate 2A (542,000) and Estimate 1A (748,000) seem to match with respect to the lower and median bound as for the number of prostitutes in the EU-28 for 2010. Although it falls outside the range of National Accounts, Estimate 2B may stand as a (very high) upper bound.

Our sample is small (28 or 29 countries) albeit consistent because EU membership is binding with respect to budget issues and the requested harmonisation of National Accounts. Moreover, the EU is an open area for both labour and capital mobility, which makes cross-border trafficking easy.

Recalling that the share of countries wherein brothels are legal is close to one fourth of total EU-28 population, our main finding for all models is that the regulation of legal brothels positively correlates with four Estimates; our results are in line with those of the existing literature. We also suggest that there is a premium for prostitution, despite some mixed evidence that the upper end segment of the prostitution market may pull prices; conversely, the lower end may be far less profitable. We bring in value added, thanks to the testing of variables related to the supply side (adult females), the demand side (adult males) and the scale effect (adult population), which all prove relevant to the number of sex workers throughout EU-28. Hence, we come up with a lower bound Estimate that may be used as a benchmark for macroeconomic policy, including fiscal issues, which fall out of the scope of this paper.

There are limitations in our study that better data should overcome to some extent.

The first limitation is that of any cross-section analysis upon a small sample. We could have extended the sample to neighbouring countries in Europe such as Norway, Switzerland, and Turkey; however, we expected that it should reinforce the impact of regulation in as much as these last two countries legalise brothels. In the absence of a reliable database for prostitution, we did not use panel data; hence, we did not address the

dynamics of prostitution. We have no robust variable addressing the demand side such as a proxy for customers that deserves dedicated surveys upon sexual behavior as well as National Accounts data for prostitution expenditure. Last, we have little evidence regarding either the share of sexual exploitation (namely coercive prostitution) vs. non-coercive prostitution, or the share of salaried vs. self-employed prostitutes that deserve dedicated surveys.

Among our research prospects, we could include the citizenship of victims in the Western sex importer countries; in spite of missing data (see Eurostat, 2013a). We may also enlarge our sample beyond Ukraine that was already included, extending our scope to non-EU neighbour countries from Eastern Europe and the Balkans. Last, prostitution may possibly be the tip of iceberg as regards the sex industry, including sex shops and the pornographic movie business industry that the Internet has triggered, we know little about. So far, investigation is lacking with respect to the spillover effects of prostitution on hotel occupation rate and cabaret dancing entertainment, etc.

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- World Bank, World Governance Indicators. The World Bank. Washington DC: USA

Appendix

Table 9. Variables used in the OLS models

| Code | Name and explanation | Data source |
|--|---|---|
| numb_prost_highoflowest Estimate 1A | <i>Number of prostitutes: highest of the lowest, circa 2010</i> | TAMPEP (2007, 2010), UNODC (2014), Charpanel (2013) |
| numb_prost_lowofhighest Estimate 1B | <i>Number of prostitutes: lowest of the highest, circa 2010</i> | TAMPEP (2007, 2010), UNODC (2014), Charpanel (2013) |
| numb_femsexwork Estimate 2A | <i>Number of female sex workers, 2011</i> | Prüss-Ustün et al (2013) |
| numb_femsexwork2 Estimate 2B | <i>Number of female sex workers, 2004</i> | Vandepitte et al (2006) |
| prost_extrapol Estimate 3 | <i>Prostitution extrapolated from victims of sexual exploitation trafficking, 2010</i> | Our calculations based on Eurostat and UNODC |
| lgdp_pc_eu | <i>GDP per capita</i> | World Bank, GDP per capita (current US\$) converted to average for 2010 US \$/€ exchange rate |
| leg_broth | <i>Legal brothels</i> | Charpenel (2013), Mendes Bota (2013) |
| leg_prost | <i>Legal prostitution</i> | Charpenel (2013), Mendes Bota (2013) |
| lpop_fem15_64_hund | <i>Adult female population</i> | Eurostat, Population statistics |
| labs_mig_fem_100 th | <i>International female migrant stock per 100 thousand of population</i> | United Nations, Population Division |
| unemp_less25_fem | <i>Unemployment rate of females below 25</i> | Eurostat, Employment Statistics Ukraine: State Statistics Service, Labour Participation Statistics |
| rate_fem_part_time | <i>Rate of female part-time workers</i> | Eurostat, Employment Statistics |
| lpop_mal15_64_hund | <i>Adult male population</i> | Eurostat, Population statistics |
| lpop_tot15_64_hund | <i>Total adult population</i> | Eurostat, Population statistics |
| contr_of_cor | <i>Control of corruption</i> | World Bank, World Governance Indicators |
| tier | <i>Tier</i> | UNODC (2014) |
| imp | <i>Import dummy variable</i> | Dummy variables for the import countries |
| region | <i>Sub-region dummy variable for the countries that are sex work importers by the region: Western and Southern Europe</i> | Dummy variables for the region |

Source: our design

Table 10. NOE components and percentage of GDP in some EU countries

| Categories | N1+N6 | N2 | N3+N4+N5 | N7 | NOE-2012 | NOE-2006 |
|-------------------|-------------|---------|----------|--------------------------|-------------------|-------------------|
| Production | Underground | Illegal | Informal | Statistical Deficiencies | % GDP (year) | % GDP (year) |
| Austria | 2.4% | 0.2% | 1.5% | 3.5% | 7.5% (2008) | 7.9% (2001) |
| Belgium | 3.8% | 0.7% | | | 4.6% (2009) | 3-4% (2002) |
| Bulgaria | | | | | | N2 = 1.3% (1999) |
| Croatia | | | | | | N2 = 0.86% (2006) |
| <i>Cyprus</i> | | | | | | |
| Czech Rep. | 6.3% | 0.4% | 1.3% | 0.2% | 8.1% (2009) | 6.6% (2000) |
| <i>Denmark</i> | | | | | | |
| Estonia | | | | | | N2 = 0.6% (2006) |
| Finland | | | | | Not provided | Not provided |
| France | 2.6% | | 0.8% | 3.3% | 6.7% (2008) | Missing in sample |
| <i>Germany</i> | | | | | Not provided | Not provided |
| <i>Greece</i> | | | | | | |
| Hungary | 3.1% | 0.8% | 3.1% | 3.9% | 10.9% (2009) | 11.6% (2000) |
| <i>Ireland</i> | | | | | Missing in sample | 4% (1998) |
| Italy | 16.2% | | | 1.2% | 17.5% (2008) | 14.8% (2003) |
| Latvia | | | | | | N2 = 1.5% (2000) |
| Lithuania | | | | | | N2 = 0.9% (2002) |
| <i>Luxembourg</i> | | | | | | |
| <i>Malta</i> | | | | | | |
| Netherlands | 0.8% | 0.5% | 0.5% | 0.5% | 2.3% (2007) | 1% (1995) |
| Poland | 12.7% | 0.9% | 0.0% | 1.8% | 15.4% (2009) | 15.7% (2002) |
| <i>Portugal</i> | | | | | Missing in sample | Missing in sample |
| <i>Romania</i> | | | | | | |
| Slovakia | 12.1% | 0.5% | 2.9% | 0.2% | 15.6% (2009) | Missing in sample |
| Slovenia | 3.9% | 0.3% | 2.8% | 3.1% | 10.2% (2007) | Missing in sample |
| <i>Spain</i> | | | | | Not available | 11.2% (2000) |
| Sweden | 3% | | | | 3% (2009) | 1.3% (2000) |
| UK | 1.5% | | 0.5% | 0.3% | 2.3% (2005) | Not provided |
| Total MS | | 8 MS | | | 17 MS | 13 MS |
| Ukraine | | | | | | N2 = 2.2% (2005) |

Source: Adair (2012), Blades (2011), Gyomai and Van de Ven (2014), UNECE (2008)