Sex work vs. sexual exploitation in the European Union:
Is prostitution a countless "necessary evil"?

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Abstract: We tackle the controversial issue of prostitution in the European Union from both the demand side and the supply side, employment and the illegal value added included in the national accounts. We sketch a typology of regimes in the EU - the prohibition *vs.* regulation *vs.* abolition of prostitution. 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 Estimate 1, thanks to data from an international NGO checked against other miscellaneous sources, and Estimate 2 from HIV prevalence. We focus upon sexual exploitation trafficking patterns and calculate Estimate 3 from victims of sexual exploitation. We design an OLS model to test the Estimates 1, 2 and 3 for prostitution according to legislation, GDP per capita, supply-side and demand-side variables. Last, we gauge prostitution as regards GDP enhancement in 2010, with respect to National Accounts adjustment for illegal production.

1. Moral and economic issues on prostitution

Prostitution, the controversial so-called "oldest profession", raises moral and economic issues that few philosophers and economists addressed. Mandeville (1714, 1724) was a forerunner considering prostitution as a legal trade subject to taxes and advocating regulation for brothels and sanitization for prostitutes (Nacol, 2015). Bentham in 1797, whilst rejecting both open prostitution without control and strict prohibition, proposed decriminalization of prostitution (Sokol, 2009)**.** The early Malthus (1798, chapter 1, 14) sketched a theory of sexual impulse and considered prostitution as a preventive check lowering the birth rate and hence adjusting population to resources. In this connection, prostitution is a second best whereas moral restraint is the first best. Malthus (1803,

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chapter 2) argues that when a general corruption of morals, with regard to sex, pervades all the classes of society, prostitution is conducive to misery, evil for social happiness, as well as distressful for the prostitutes themselves. Malthus stands for virtue, making it clear that prostitution is a moral offence for both men and women, although he states no conclusive recommendation as regards the population check *vs.* virtue trade-off. Lecky (1869, 282) contends that virtue, as the basis of moral conduct, is all but dubious, regarding prostitution as a "safety valve" (Stuart Mill, 1870c). He supports sanitary measures for prostitutes in order to prevent contagious diseases. In contrast with both Malthus and Lecky, Stuart Mill (1870c) denies that prostitution should be regulated on the supply side (that of the women); rather should impulse be tamed through reason on the demand side (that of men). He suggests that the State should prosecute customers on the demand side. He holds that forced medical examination will lead to a great amount of clandestine prostitution. He objects to consigning prostitutes to hospitals against their will. He argues that diseases are not transmitted at first by women but by men. Hence, he advocates abolition.

Since the 1960s, sex and procreation are clearly disentangled and the Malthusian check does not hold anymore, although the plague of AIDS is still underway. Advocacy for free sex including prostitution (Hakim, 2015) confronts the virtuous stance on abolition (Charpenel, 2013), echoing the philosophers and economists whose doctrines inspired current legislation and the various policy regimes regarding prostitution in the European Union (EU). Prostitution is back again on the agenda: the issue is discussed in the EU political arena (Mendez Bota, 2014; Schulze, 2014) and deserves special attention from Eurostat since illegal production is included into the national accounts.

The paper is structured as follows. Section 2 sketches a typology of prostitution regimes in the EU - the prohibition vs. regulation vs. abolition of prostitution. Section 3 provides an overview of the data sources on the demand-side and the supply-side in order to gauge 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 2. Section 4 is 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.

2. A typology of prostitution regimes: prohibition *vs.* regulation *vs.* abolition

Prostitution is ruled according to three different policy regimes in European countries: *prohibition*, *regulation* and *abolition* (Jakobsson and Kotsadam, 2013; Mendes Bota, 2014).

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 decriminalization 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 and Lecky, prostitution is a necessary evil as well as a trade. It refers to where prostitution in brothels is legal, with tax collection from the State and intervention as regards 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, sexual exploitation is evil and it should be extinct as well as non-coercive sex trade. It refers to the position that prostitution must be banned by criminalizing not the prostitutes themselves but third parties such as pimps and brothels keepers. This policy regime refers to the United Nations Universal Declaration of Human Rights (1948). It 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, Sweden[3] 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, which is 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 sew work.

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

It is usually agreed that data on prostitution are scant; hence, experts calculation is either coined as 'guesstimates' or sometimes taken at face value. There are various data sources,

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

among which we can distinguish between qualitative and quantitative surveys issued from primary as well as secondary sources. They are used to compile the magnitude of employment and value added for national accounts.

3.1. The demand side

Although there are large surveys on sexual behavior in France, Finland and the UK, they do not address the issue of paying for sex (Hakim, 2015). Demand for prostitution is little documented. All studies agree that it comes from men. The issue remains controversial as regards male behaviour. Cho et al (2013) hold the Malthusian assumption that demand is inelastic, whereas demand is on rise according to Hakim (2015), 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). On the other hand, the implicit assumption for abolitionists is in line with Stuart Mill contending that demand can and should be tamed.

Demand is both domestic and foreign. In Sweden, 80 per cent of men who have paid for sex did so abroad. In the UK, the share is two-thirds of men who paid for sex in the previous five years (Hakim, 2015). 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 nine per cent in the UK. See Table 1.

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	7	7,941	1991
UK	9		2000

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

Data from quantitative surveys apply to five EU countries and date back to the 1990s, mostly before the Internet propelled easy access to sex services. The information relates to the question 'did the respondent pay at least once for sex with a prostitute'. Actually, much smaller proportions of men buy sex regularly and they belong to all socio-economic groups.

A pilot study upon a small and non-random sample of clients (Anderson and O'Connell Davidson, 2003) has surveyed Denmark (13 interviewees) and Italy (56 interviewees), using control groups and a survey (including Sweden for 84 respondents). The conclusion is that interview research cannot be taken as providing a snapshot of *all* forms of demand. Statistics Denmark (2005) has compiled data for the frequency of purchase for prostitution services (25 percent at least once and 28% 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 in-depth interviews (50) in 2006, whereas in Scotland Farley et al (2011) used a sample of 110 men in 2008; these two studies comprise a strong self-selection bias.

What is the share of clients among the 168 million adult male EU population? Presumably, there is only a small share of clients among this population and we ignore what might be the patterns of sexual behavior, which vary across EU countries and depend upon prices. 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. They fuel both direct and indirect measurements. As for direct measurement, there are qualitative surveys upon small non-random samples in three EU countries that have regulatory prostitution regimes. 54 sex workers were interviewed in Germany (Farley et al, 2003); 82 sex workers were interviewed in Austria

and 44 in the Netherlands (Wagenaar et al, 2013). Wagenaar et al (2013) 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. Regarding direct measurements, TAMPEP (2007, 2009, 2010), an international foundation defending sex workers, issued a standardised questionnaire among its network, collecting 380 responses from 600 questionnaires sent to key organisations, mostly NGO (56%) and Health Services (22%) in direct contact with sex workers. It helped building up a mapping and reports for 23 EU countries: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Greece, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Latvia, Luxembourg, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and the United Kingdom. Croatia, Cyprus, Ireland, Malta and Sweden are missing, and Ukraine is included. 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 we used rather as a qualitative assessment.

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

12 EU countries wherein the share of migrants among sex workers is above 50 per cent are net importers; the UK is an outlier. Conversely, 10 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%), Bulgaria (8%),

Hungary (4%), Poland (4%), Czech Republic (3%) Slovakia (3%) Latvia (3%), Lithuania (3%) and Estonia (3%) were the most mentioned nationalities. It is worth mentioning Ukraine (7%).

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 keepers) who retains a larger share of earnings. The figures for nationals are opposite: one third is prone to be exploited by third party.

From aforementioned TAMPEP data **i**ncluding both nationals and migrants, we make an educated guesstimate. It suggests that over one third (36 per cent) of sex workers might be independent from third party (but not from family ties) and can be considered as self-employed (including part-time sex workers), whereas the overwhelming majority of sex workers is trapped in forced labour. Migrants represent the largest share of sex workers and are more dependent on third party (TAMPEP, 2010).

Table 2. 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%	*Import*	15%	27,000-30,000	2008
Belgium		60%	*Import*	34%	15,000-20,000	2008
Bulgaria	98%			33%	6,000-10,000	2008
Croatia						
Cyprus						
Czech Rep	59%			19 %	10,000-13,000	2008
Denmark		65%	*Import*	25%	5,560	2008
Estonia	95%			2%	1,000-1,200	2008
Finland		69%	*Import*	10%	5,000-6,000	2008
France		61%	*Import*	61%	18,000-30,000	2008
Germany		65%	*Import*	13%	400,000	2008
Greece		73%	*Import*	60%	10,000	2008
Hungary	75%			40%	10,000-15,000	2008
Ireland						
Italy		90%	*Import*	60%	50,000	2008
Latvia	88%			40%	2,000-3,000	2008
Lithuania	90%			57%	1,250–1,550	2008
Luxembourg		92%	*Import*	30%	5,000	2008

Malta					
Netherlands		60%	*Import*	11%	10,000-15,000	2008
Poland	66%			40%	10,000	2008
Portugal		56%	*Import*	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%	*Import*	46%	6,000	2008
Sweden						2008
UK		41%		23%	80,000	2008
EU-23					693,000-730,000	
Ukraine			*Import*		50,000-83,000	2006

Source: TAMPEP (2007, 2009, 2010)

In order to do justice to other estimates and fill in the vacuum (five countries are missing), we picked up the estimates from the UNODC (2014) and the Scelles foundation (Charpenel, 2013). Not only there are discrepancies between estimates from the various sources, but there is also a gap as regards the lower bound *vs.* the upper bound for some countries (for instance, Romania). 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 and came up with a lower estimate (1A) lightly below 750,000 prostitutes; when calculating the lowest of the highest figures, the higher estimate (1B) stands slightly over 1,300,000 prostitutes, which is 75 per cent higher. In between, the median estimate would be slightly over a million prostitutes. See Table 3.

Table 3. 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	1 840,4	27,000-30,000	5,500-10,000	10,000	27,000	0.54	1.46
Belgium	2 018,0	15,000-20,000	10,000-15,000	15,000	20,000	0.74	1.0
Bulgaria	1 431,2	6,000-10,000	8,000-10,000	10,000	10,000	0.7	0.7
Croatia	749,4		6,700	6,700	6,700	0.9	0.9
Cyprus	183,1			*0,915*	*1,446*	*0.55*	*0.79*
Czech Rep.	2 057,1	10,000-13,000	5,000-25,000	13,000	25,000	0.63	1.21
Denmark	1 275,9	5,560	5,500	5,500	5,500	0.43	0.43
Estonia	278,9	1,000-1,200	1,000	1,000	1,200	0.35	0.43

Finland	1 176,0	5,000-6,000	12,000-15,00	6,000	15,000	0.51	1.27
France	12 153,9	18,000-30,000	18,000-20,000	20,000	30,000	016	0.24
Germany	17 591,3	400,000	150,000-400,000	150,000	400,000	0.85	2.27
Greece	1 764,7	10,000	1,200-20,000	10,000	20,000	0.56	1.13
Hungary	1 726,3	10,000-15,000	8,000-10,000	10,000	15,000	0.58	0.87
Ireland	860,3		1,000	1,000	1,000	0.11	0.11
Italy	9 063,5	50,000	50,000-100,000	50,000	100,000	0.55	1.10
Latvia	435,5	2,000-3,000	15,000-20,000	3,000	20,000	0.69	4.59
Lithuania	645,6	1,250–1,550		1,550	1,550	0.24	0.24
Luxembourg	95,1	5,000		5,000	5,000	5.25	5.25
Malta	55,5			467	0.467	0.84	0.84
Netherlands	3 801,6	10,000-15,000	20,000-30,000	15,000	30,000	0.39	0.79
Poland	6 814,9	10,000	12,000	10,000	12,000	0.14	0.17
Portugal	2 186,8	9,700	28,000	9,700	28,000	0.44	1.28
Romania	3 618,1	2,500-3,800	2,000-23,000	3,800	23,000	0.10	0.63
Slovakia	1 028,7	7,500		7,500	7,500	0.73	0.73
Slovenia	432,1	1,500-3,000-		1,500	3,000	0,14	0.69
Spain	8 236,2	6,000	300,000-400,000	300,000	400,000	3.64	4.85
Sweden	2 091,6		1,500	1,500	1,500	0.07	0.07
UK	13 262,9	58,000-80,000	80,000-100,000	80,000	80,000	0.6	0.6
EU-28	96 874,7	693,000-730,000	740,400-1,253,700	747,970	1309,634	*0.77*	*1.35*
Ukraine		50,000-83,000	50,000-83,000	50,000	83,000		

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

As a share of adult females, prostitution is below or over one percent on average with respect to estimates. As for the lowest estimate (A), few countries are above average: large countries such as Spain and Germany, as well as small ones such as Luxembourg and Croatia, among which Germany is the only one that regulates prostitution. As for the highest estimate (B), in addition to the previous list (without Croatia), Austria regulates prostitution whereas Finland, Latvia and Portugal do not.

3.3. Prostitution, employment and informal employment in 2010

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 as well as self-employed within the formal and the informal sector

(Hussmanns, 2004). Employees are considered to have informal jobs if their employment relationship is, in law or in practice, not subject to national labour legislation, income taxation, social protection or entitlement to certain employment benefits (advance notice of dismissal, severance pay, paid annual or sick leave, etc.).

The reasons may be the following: non-declaration of the jobs or the employees; casual jobs or jobs of a limited short duration; jobs with hours of work or wages below a specified threshold; employment by unincorporated enterprises or by persons in households; jobs where the employee's place of work is outside the premises of the employer's enterprise; or jobs for which labour regulations are not applied, not enforced, or not complied with for any other reason. As for self-employed (unincorporated enterprises), their job is informal in as much as it is not registered, escaping both income taxation and social security contribution payment.

Informal female employment is not compiled in the EU. It may be approximated by the absence of a fixed contract, which applies to employees without a limited duration contract and to self-employed.

Prostitutes do not usually have a fixed contract ensuring that they benefit from labour and social regulations. Such is the case for sex workers even when are employed in massage parlours or other legal activities. In as much as prostitutes are considered as self-employed workers, whether it is forced labour (illegal) or non-coercive sex work (legal), they do not have any contract and are informal workers.

3.4. 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 4, we estimate the number of female sex workers using an indirect measure from HIV prevalence collected from the World Health Organisation (WHO). There are two series of data: In the first series, data for 23 EU countries and Ukraine come from either 2000 or 2004 (Vandepitte et al, 2006); after adjusting for missing data with the median value of HIV prevalence in the EU (0.5%), the number of females sex workers is slightly below one million. In the second series, data for 24 EU countries and Ukraine come from 2011 (Prüss-Ustün et al, 2013); after adjusting for missing data with the median value of HIV prevalence in the EU (0.3%), the number of females sex workers shrinks to slightly over half a million. In as much as the former magnitude is 80 per cent higher than the latter one, such dramatic fall from 2004 to 2011 is puzzling. On the one hand, a sharp drop in HIV prevalence only due to safer sex practices seems quite unlikely; hence, one should not conclude that the magnitude of prostitution has declined, which would run opposite to the trend in demand. On the other hand, there is no strong reason to assume that recording has deteriorated over time. We have no clue to decide whether the early 2000s series is overstating the magnitude of sex work or that the 2011 series is understating it, although this may be the case. However, the former estimate is mixing dates and encapsulates more missing data; whereas the latter estimate from 2011 series is much closer to our reference year (2010) and it is more consistent. Hence, it stands as our Estimate 2.

Table 4. 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
Cyprus	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
Ireland	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
Malta	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
Portugal	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%**	976,1183
Ukraine	16 746 093	0.2	33492	0.4%	26,944

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

* Median value

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, hence the quality of institutions. 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 5.

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, building up an extrapolation from a double investigation (capture-recapture) based on reported cases from different sources (research institutes, NGOs and the media).

As for the prevalence of forced labour (number of victims per thousand inhabitants), the ratio is highest in the Central and South-Eastern Europe and Commonweatlth of Independent States regions at 4.2 per 1,000 inhabitants respectively, and lowest in the Developed Economies & European Union at 1.5 per 1,000 inhabitants.

Forced sexual exploitation is mostly affecting women (98%). The average duration is less than 18 months for commercial sexual exploitation.

Box 1. Computation of the ILO's estimate

T_i is the estimate of forced labour in country i based on a national survey with reference period t_i. The estimate refers to the total number of persons who experienced forced labour at some time during the t-year reference period of the survey. The corresponding number for a ten-year reference period (120 months) is $(120/\mu_i)T_i$, where μ_i is the average duration in forced labour, measured in months, for country i.
The comparison of the adjusted survey result with the capture-recapture estimate for the corresponding country provides an estimate of the share of reported number of victims in total forced labour in that country.

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 new trends such as 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 % of the total number of suspected traffickers over the three reference years.

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 subregional 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% of the total number of detected victims, 4% from Europe cross-border and 40% from Central Europe and the Balkans. In Central Europe and the Balkans, domestic trafficking accounts for about 80% cent of the detected victims.

Box 2. 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 at the moment of research. 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. In 2010, Ukraine "improved" the rating by moving from "Tier 2 Watch List" to "Tier 2" where the country stayed until 2012, and in 2013 Ukraine was moved again to the "Tier 2 Watch List".

The Ministry of Internal Affairs of Ukraine for 2010, recorded 257 facts of human trafficking and 277 persons became victims of human trafficking, including 204 women, 73 men and 41 children. 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, according to the Joint United Nations Programme on HIV and AIDS (UNAIDS, 2013). On the other hand, the International Organisation of Migrations (IOM, 2014) records a number of victims of human trafficking for 2010 that is four or at least three times higher: 1085 victims were identified on the territory of Ukraine, 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 (Ministry of Social Policy of Ukraine, 2015). The criminal verdicts are reached in less than quarter of cases. It is difficult on official statistics as for human trafficking and prostitution because "the police are mostly associated in detecting small and insignificant facts of criminal activity of human trafficking. Long lasting criminal activity of organized groups on an international level is ignored" (Levchenko, 2012). 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 1085 according to the aforementioned sources (UNAIDS, 2013; IOM, 2014).

According to the State Statistics Service of Ukraine (2014), in 2010 the main EU countries of destination for the Ukrainians were Germany (50%), Czech Republic (19%), Spain (11%), Italy (5%) and Poland (5%). The International Women's Rights Center "La Strada-Ukraine" reports that most phone calls they received in 2010 (46%) were regarding job arrangement abroad. Germany is a main destination country for Ukrainians. Among Ukrainian job-seekers in Germany in 2010, 73 per cent of them were women, and this number has a slightly growing trend (Bundesamp fur Migration und Fluchtlinge, 2014). Ukraine is often mentioned as one of the main providers of prostitutes to the Western countries.

Among the detected victims trafficked to EU countries, sexual exploitation is prevalent (66.25%). Although Western and Central Europe, especially the EU Member States do reach the worldwide highest score with respect to deterrence, half of suspected offenders is prosecuted and about 30% 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 5 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).

Table 5. 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	1605	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		4998	4057	5484	1.161416	767,760

| Ukraine | 455,98 | Tier 2 WL | | 234 | 234 | 0.511151 | 32,760 |

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 victim[4]. 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 prostitutes may be rising over time and this should lower prices, unless there is an increase in demand.

We apply the multiplier (times 20 and 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 the distribution: for instance, Germany counts less prostitutes than the Netherlands albeit five times larger

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[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.

a population. Hence, one may be very skeptical as for the accuracy of such a proxy to gauge prostitution at country level.

5. Testing the estimates of prostitution

5.1. Literature review

The literature review as regards the economics of prostitution is scarce and three papers address the issue of sexual exploitation trafficking we briefly review.

First, Akee et al. (2011) use a game-theoretic model to explore three characteristics of the human trafficking market –the cross-border ease of mobility of traffickers, the relative bargaining strength of traffickers and final buyers, and the elasticity of buyers' demand. They estimate upon a sample of 190 countries a gravity model of trafficking depending on GDP per capita and distance as well as governance indicators. Results show some evidence that domestic and foreign enforcement do mutually reinforce one another, due to ease of mobility, there is partial bargaining power, and demand.is inelastic. They find that legalized 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 legalized prostitution as such is not addressed, because the authors implicitly and wrongly assume that such legalization is equivalent to weak enforcement of anti-trafficking laws, whereas human trafficking is illegal even if prostitution is legal. In contrast, Jakobsson and Kotsadam (2013) find a positive effect of legalized prostitution on human trafficking in a cross-sectional dataset of 31 European countries. Using the ILO and UNODC datasets, they investigate the relationship between prostitution legislation and the prevalence of trafficking. They find that the sexual exploitation trafficking of women is least prevalent in countries where prostitution is illegal, most prevalent in

countries where prostitution is legalized, and in between in those countries where prostitution is legal but procuring illegal. Case studies of Norway and Sweden that have criminalized buying sex support the possibility of a causal link from harsher prostitution laws to reduced trafficking.

Cho et al (2013) address the effect of legalizing prostitution on the demand, supply, and thus equilibrium quantity of 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, legalizing prostitution will increase demand for prostitution. On the supply side, legalizing prostitution will induce some potential sex workers (or their pimps) to enter the market, those who were deterred from offering such services by the threat of prosecution. Supply might decline due to tax collection from legalized prostitution, whereas illegal prostitution pays no taxes. However, those unwilling or unable to operate legally (including tax payment), can continue to operate illegally. Before, their business was illegal because prostitution was illegal; now their business is illegal. due to their tax evasion in the shadow economy. Authors argue that theoretically the legalization 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.

5.2. Methodology and results

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

We test the following model:

$y_i = \alpha + \beta_1 Prostitution_i + \beta_2 Xi + \beta_3 Sub\text{-}regions_i + \varepsilon_i$

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.

We inspired from Cho et al. (2013) as well as Jakobsson and Kotsadam (2013) for the variable *Prostitution$_i$*. We test both legal status either prostitution or brothels in country *i*, by testing two dummy variables. First, whether or not prostitution is legal, 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^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*

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[5] In order to design the best models we run numerous regressions with several different variables such as the size of households, urbanization, Internet use, earnings, educational attainment, status in employment and rate of activity for females. All variables regressions are available upon request.

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.

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 2, 1A, 1B and 3.

As regards the series for EU-28, our comments are the following.

GDP per capita is it only significant for Estimate 2 and negative, 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 1%) and positive, making sure that prostitutes are women.

As for all models in Estimates 2, 1B and 3, *legalized brothel* is significant (p-value is 5%) and 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 *legalized prostitution* is significant (p-value is 5%) and positive.

International female migrant stock per 100 thousand of population is very significant (p-value is 1%) for all models in Estimate 2 and positive in all Estimates save Estimate 3.

Unemployment rate of females below 25 is only significant for all models in Estimate 2 and negative in all other Estimates, suggesting that unemployment does not drive prostitution.

Rate of female part-time workers.is weakly significant 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 1%) and positive, making sure that customers are men.

As for all Estimates, *Total adult population* is always very significant (p-value is 1%) and positive, taking into account the scale effect in line with the results of Cho et al (2013).

As regards the series for EU-28 plus Ukraine (29 countries) our comments are quite similar.

GDP per capita is weakly significant for Estimate 2 (p-value is 10%) and negative, 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 1%) and positive, making sure that prostitutes are women.

Only for Estimate 3, *legalized brothel* is significant (p-value is 5%) and positive, in line with the results of existing literature (Cho et al, 2013; Jakobsson and Kotsadam, 2013).

Table 6a. Testing the estimates with the OLS models

Variables	Estimate 2			Estimate 1A			Estimate 1B			Estimate 3		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	lnumb_femsexwork			lnumb_prost_highoflowest			lnumb_prost_lowofhighest			lprost_extrapol		
lgdp_pc_eu	-0.847***	-1.005***	-0.862***	0.369	0.336	0.353	0.087	0.054	0.071	-0.115	-0.134	-0.125
	(0.188)	(0.168)	(0.190)	(0.444)	(0.443)	(0.445)	(0.588)	(0.588)	(0.588)	(0.451)	(0.447)	(0.449)
lpop_fem15_64_hund	1.027***			0.877***			0.903***			0.572***		
	(0.068)			(0.142)			(0.141)			(0.182)		
leg_broth	0.568**		0.562**	0.742	0.725	0.732	1.109**	1.095**	1.101**	1.327**	1.322**	1.324**
	(0.205)		(0.204)	(0.544)	(0.536)	(0.540)	(0.481)	(0.474)	(0.477)	(0.602)	(0.599)	(0.601)
leg_prost		0.540		0.731**	0.742**	0.739**	0.823*	0.836*	0.832*	0.671	0.681	0.677
	(0.143)	(0.151)	(0.146)	(0.340)	(0.335)	(0.338)	(0.459)	(0.458)	(0.458)	(0.432)	(0.436)	(0.434)
labs_mig_fem_100th	0.415***	0.515***	0.428***	0.188	0.216	0.202	0.207	0.234	0.221	-0.635*	-0.622*	-0.628*
	(0.143)	(0.151)	(0.146)	(0.243)	(0.241)	(0.242)	(0.347)	(0.348)	(0.348)	(0.343)	(0.345)	(0.344)
unemp_less25_fem	-0.039***	-0.039***	-0.039***	-0.000	-0.000	-0.000	-0.010	-0.010	-0.010			
	(0.009)	(0.012)	(0.009)	(0.024)	(0.024)	(0.024)	(0.022)	(0.022)	(0.022)			
rate_fem_part_time	-0.006	-0.003	-0.007	-0.024*	-0.024*	-0.024*	-0.025*	-0.025*	-0.025*	0.021*	0.021*	0.021*
	(0.007)	(0.006)	(0.007)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.011)	(0.011)	(0.011)
lpop_mal15_64_hund		1.058***			0.884***			0.907***			0.571***	
		(0.076)			(0.141)			(0.140)			(0.183)	
lpop_tot15_64_hund			1.029***			0.881***			0.906***			0.572***
			(0.068)			(0.142)			(0.141)			(0.183)
Constant	11.360***	11.601***	10.683***	0.626	0.716	0.050	3.754	3.856	3.166	12.191***	12.276***	11.831***
	(1.561)	(1.809)	(1.565)	(3.632)	(3.610)	(3.618)	(3.843)	(3.833)	(3.829)	(3.995)	(3.965)	(4.049)
Observations	28	28	28	28	28	28	28	28	28	28	28	28
R-squared	0.930	0.930	0.929	0.812	0.816	0.814	0.790	0.792	0.791	0.747	0.746	0.746

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

Table 6b. Testing the estimates with the OLS models

Variables	Estimate 2			Estimate 1A			Estimate 1B			Estimate 3		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	lnumb_femsexwork			lnumb_prost_highoflowest			lnumb_prost_lowofhighest			lprost_extrapol		
lgdp_pc_eu	-0.464*	-0.518*	-0.490*	-0.174	-0.224	-0.198	-0.359	-0.409	-0.383	0.000	-0.038	-0.019
	(0.258)	(0.255)	(0.256)	(0.275)	(0.279)	(0.277)	(0.321)	(0.323)	(0.322)	(0.286)	(0.286)	(0.286)
lpop_fem15_64_hund	0.914***			0.866***			0.858***			0.698***		
	(0.088)			(0.115)			(0.113)			(0.144)		
leg_broth				0.642	0.624	0.632	0.252	0.286	0.269	1.310**	1.301**	1.304**
				(0.469)	(0.459)	(0.464)	(0.235)	(0.236)	(0.236)	(0.628)	(0.625)	(0.626)
leg_prost	0.691*	0.701*	0.698*	0.799*	0.810*	0.807*	-0.002	-0.003	-0.003	0.437	0.445	0.443
	(0.351)	(0.356)	(0.353)	(0.395)	(0.395)	(0.395)	(0.016)	(0.016)	(0.016)	(0.456)	(0.461)	(0.458)
labs_mig_fem_100th	0.140	0.174	0.157	0.308*	0.342**	0.325*	0.926*	0.937*	0.934*	-0.468	-0.443	-0.455
	(0.202)	(0.200)	(0.201)	(0.164)	(0.164)	(0.163)	(0.499)	(0.500)	(0.499)	(0.290)	(0.294)	(0.292)
unemp_less25_fem	-0.016	-0.017	-0.016	0.002	0.002	0.002	1.035**	1.018**	1.026**			
	(0.014)	(0.013)	(0.014)	(0.018)	(0.018)	(0.018)	(0.439)	(0.431)	(0.435)			
rate_fem_part_time												
lpop_mal15_64_hund		0.919***			0.873***			0.864***			0.699***	
		(0.086)			(0.115)			(0.114)			(0.146)	
lpop_tot15_64_hund			0.917***			0.870***			0.862***			0.699***
			(0.087)			(0.116)			(0.114)			(0.145)
Constant	9.068***	9.317***	8.542***	4.398	4.603	3.882	7.127**	7.338**	6.620**	9.955***	10.130***	9.547***
	(1.933)	(1.919)	(1.927)	(2.884)	(2.887)	(2.888)	(2.852)	(2.864)	(2.859)	(3.038)	(3.019)	(3.090)
Observations	29	29	29	29	29	29	29	29	29	29	29	29
R-squared	0.888	0.891	0.890	0.787	0.790	0.788	0.771	0.772	0.772	0.715	0.713	0.714

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

International female migrant stock per 100 thousand of population is only significant or weakly significant for Estimates 1A and 1B (p-value is 10% and 5%); it is negative for Estimate 3.

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

For all Estimates, *Adult male population* on the demand-side is always very significant (p-value is 1%) and positive, making sure that customers are men.

As for all Estimates, *Total adult population* is always very significant (p-value is 1%) and positive, taking into account the scale effect in line with the results of Cho et al (2013).

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 that are 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 8 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 3. 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, which 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 ESA 2010, the European System of Accounts (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 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.

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 according to Van de Ven (2015).

We compiled estimates for N2 and for prostitution from the supply side as of 22 EU Member States, which account for a 58.53 per cent share of EU-28 GDP in 2010, unfortunately six countries (France, Germany, Greece, Lithuania, Poland and Slovakia) are missing in the sample. With such piecemeal data, we calculated that N2 could amount to 0.47 percent of EU-28 GDP in 2010, whereas prostitution could amount for 0.16 per cent of EU-28 GDP in 2010. Coverage for prostitution from the demand side (expenditure) 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.

Table 7. Illegal production and prostitution

EU Member States	2010 GDP (€ billion)	N2 as % of 2010 GDP	Prostitution Supply-side		Prostitution Expenditure side	
			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
France	1,933	Nc	Nc	Nc	Nc	Nc
Germany	2,499	0.1%	Nc	Nc	Nc	Nc
Greece	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
Lithuania	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*	Na	*Na*	*Na*	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
Slovakia	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	0.47% (€ 57.875,8)	0.16% (mean 22 countries: 58.4% of EU-28 GDP)	(€ 19.702,4)	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

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): $P = sw$ x $cust$ x p

We assume that the average prices per client is € 50; the number of clients is 20 a week, and there are 43working weeks a year[6].

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

[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.

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 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 0.16% mean share of prostitution in GDP, overall share in EU-28 GDP would amount to € 19.702,4 billion. Gross sales turnover (including intermediate consumption for 20%) would then reach € 24.628 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 € 24.628 billion Gross sales turnover by this average number of clients times the € 50 average price; we come up with 572,750 prostitutes. If € 40 were the average price per client, the number of prostitutes would reach 715,930.

If we divide € 24.628 billion Gross sales turnover by 572,750 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 € 24.628 billion Gross sales turnover by 715,930 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% of total earnings (TAMPEP, 2010; Kazemier et al, 2013). In so far there are 572,750 prostitutes; each prostitute would get average net earnings of € 21,500 per year and €1,791 per month. In as much there are 715,930 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_eanings); 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% 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% 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.

Conclusion

Data sources on prostitution are scant and rather inconsistent. To our best knowledge, the four estimates we have compiled are the first ones as regards the economic literature on prostitution. Our purpose was to test these estimates in order to get a benchmark for the EU-28 in 2010, according to some reasonable assumptions. The OLS tests suggest that Estimate 2 (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, Estimate 2 looks 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 2 (542,000) and Estimate 1A (748,000) seem to match with respect to the low and median figures as for the number of prostitutes in the EU-28.

Our sample is small (28 or 29 countries) albeit consistent because EU membership is binding with respect to budget issues and the requested harmonization 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 legalizing brothels is close to one fourth of total EU-28 population, our main finding for all models is that the legalization of brothels is positively correlated with three Estimates; our results are in line with those of the existing literature. We bring in value added with the testing of variables related to the supply side (adult females), the demand side (adult males) and the scale effect (adult population) that all prove relevant to the number of sex workers throughout EU-28.

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 legalize 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 expect to include the citizenship of victims in the Western sex importer countries, in spite of missing data (see Eurostat, 2013a). We will 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. In this connection, investigation is lacking with respect to the spillover effects of prostitution on hotel occupation rate and cabaret dancing entertainment, etc.

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Appendix

Table 8. Variables used in the OLS models

Code	Name and explanation	Data source
numb_prost_highoflowest Estimate 1A	*Number of prostitutes: highest of the lowest*, circa 2010	TAMPEP (2007, 2010), UNODC (2014), Charpanel (2013)
numb_prost_lowofhighest Estimate 1B	*Number of prostitutes: lowest of the highest*, circa 2010	TAMPEP (2007, 2010), UNODC (2014), Charpanel (2013)
numb_femsexwork Estimate 2	*Number of female sex workers, 2011*	Prüss-Ustün et al (2013)
prost_extrapol Estimate 3	*Prostitution extrapolated from victims of sexual exploitation trafficking,* 2010	Our calculations based on Eurostat and UNODC
lgdp_pc_eu	*GDP per capita*	World Bank, GDP per capita (current US$) converted to average for 2010 US $/€ exchange rate
leg_broth	*Legal brothels*	Charpenel (2013), Mendes Bota (2013)
leg_prost	*Legal prostitution*	Charpenel (2013), Mendes Bota (2013)
lpop_fem15_64_hund	*Adult female population*	Eurostat, Population statistics
labs_mig_fem_100th	*International female migrant stock per 100 thousand of population*	United Nations, Population Division
unemp_less25_fem	*Unemployment rate of females below 25*	Eurostat, Employment Statistics For Ukraine: State Statistics Service fo Ukraine, Labour Participation Statistics
rate_fem_part_time	*Rate of female part-time workers*	Eurostat, Employment Statistics
lpop_mal15_64_hund	*Adult male population*	Eurostat, Population statistics
lpop_tot15_64_hund	*Total adult population*	Eurostat, Population statistics
contr_of_cor	*Control of corruption*	World Bank, World Governance Indicators
tier	*Tier*	UNODC (2014)
imp	*Import dummy variable*	Dummy variables for the import countries
region	*Sub-region dummy variable for the countries that are sex work importers by the region: Western and Southern Europe*	Dummy variables for the region

Source: our design

Table 9. 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)
Cyprus						
Czech Rep.	6.3%	0.4%	1.3%	0.2%	8.1% (2009)	6.6% (2000)
Denmark						
Estonia						N2 = 0.6% (2006)
Finland					Not provided	Not provided
France	2.6%		0.8%	3.3%	6.7% (2008)	Missing in sample
Germany					Not provided	Not provided
Greece						
Hungary	3.1%	0.8%	3.1%	3.9%	10.9% (2009)	11.6% (2000)
Ireland					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)
Luxembourg						
Malta						
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)
Portugal					Missing in sample	Missing in sample
Romania						
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
Spain					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)