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Abstract:
The publication of Donohue and Levitt (2001)'s paper on the impact of legalized abortion on the decline of crime in the US has created a wide debate in the literature. However, the vast majority of papers have been implemented in the US setting, and the few other works were single-country studies. In this research, we aim to provide new evidence on the abortion-crime link by examining this issue using a sample of 16 Western European countries. The cross-country investigation allows the exploitation of the different dates of abortion legalization in Europe. We perform regressions of crime rates on the share of aborted adults, defined as the accumulation of aborted children in the past that would have become adults. We find that abortion rate has a significant and negative impact on crime rates, specifically, homicide and theft. We also observe support for the impact of legalization of abortion on the reduction of crime when considering different calculations of the accumulation of abortions based on different criteria for the legalization of abortion. Thus, our results are consistent with the findings of Donohue and Levitt (2001) for the US.

Keywords: Abortion; Crime; Theft; Homicide

JEL Classification: J13: K42.

1. Introduction

Since the seminal Donohue and Levitt article (2001), which was popularized around the world in Levitt and Dubner's book (2005), the impact of legalizing abortion on crime has been largely debated. Legalizing abortion is supposed to lead to diminishing crime in two ways. First, it reduces the fertility rate, reducing the proportion of young males in the population, which are generally overrepresented among criminals. Second, it selects non-criminal profiles because mothers abort when they feel that they are unable to raise children under favorable material or emotional conditions. This second version is advocated by Levitt, who expresses it as follows: "Unwantedness leads to high crime; abortion leads to less unwantedness; abortion leads to less crime." The Donohue and Levitt (2001) (DL hereafter) general statement includes both effects.

These effects have been extensively discussed by economists. Oddly, this debate has focused on the measures used or the sophistication of the estimates, using only single-country specific studies, with most articles dealing with the US setting (Joyce, 2004; Donohue and Levitt, 2004, 2008; Foote and Goetz, 2008). Very few works have examined this issue using data from other countries (e.g., Pop-Eleches, 2006, for Romania; Kahane, Paton and Simmons, 2007, for England and Wales).

It is then surprising that very little attention has been paid to cross-country tests, which provide more variance of the dates of abortion legalization. At present, many countries have allowed abortion upon request for over thirty years. While cross-country analysis does not provide highly sophisticated data today, it allows us to directly answer this basic question: does legalizing abortion reduce crime? Thanks to the variance in the dates of abortion legalization and the extent to which it is permitted, this issue is clarified in this paper by providing a cross-country analysis of the relationship between abortion and crime based on a sample of 16 Western European countries.

To this end, we perform regressions of crime rates, by considering separately two categories of crime, homicide and theft, for the period 1990-2007. Our key explaining variable is the ratio of the share of aborted adults, defined as the number of aborted children in the past that would have become adults, to the population. The cross-country investigation of this issue comes at a cost; it forces us to face more data limitations than such single-country studies as Donohue and Levitt (2001) for the US or Kahane, Paton and Simmons (2007) for England and Wales. We are not able to use arrests by offender age, as these data are not available by country and year**.** Nonetheless, what we sacrifice in data accuracy, we gain in

generality and variance by exploiting the cross-country dimension in the dates of legalized abortion to provide an additional piece of evidence.

We are only aware of two articles analyzing this issue in a cross-country framework: Dills et al. (2010) and Buonanno et al. (2011). Both papers find no robust evidence in favor of the DL hypothesis. However, the first paper only compares series of abortion and crime over time, without providing multivariate estimates, and the second only considers seven European countries in addition to the US in the sample. As a consequence, the latter paper does not exploit the large variance in the dates of legalization across European countries. Moreover, the relationship between abortion and crime is not the core of the article, as Buonanno et al. (2011) provide a global investigation of the factors driving crime, with abortion being just one of the tested determinants.

We thus provide two key contributions to the literature. First, we contribute to the analysis of the abortion-crime link by extending this highly debated issue to a cross-country dataset outside the US. By looking at different countries rather than restricting the analysis to one country, we are able to provide a different view on this issue. Second, we contribute to the understanding of the determinants of delinquency in Europe. In contrast to the US, no strong decline in crime has been observed in Europe since the beginning of the 1990s. While property crimes have been decreasing, violent crimes have increased for the last two decades (Aebi and Linde, 2010; Buonanno et al., 2011). It is therefore of particular interest for European policymakers to understand the driving forces of the evolution of crime rates.

The rest of the article is structured as follows. In Section 2, we present the literature regarding the relationship between abortion and crime. In Section 3, we describe the evolution of offenses and abortion in Western Europe. Section 4 develops the method. Section 5 displays the results. We conclude in Section 6.

2. The abortion-crime link

We begin by briefly developing the contents of the seminal paper from DL. We then turn to the debate that has stemmed from this paper in the form of criticisms and responses. Finally, we present international evidence on this issue.

DL begin their investigation with the observation of the impressive decline in crime in the US during the 1990s. They note the incompleteness of the factors generally used to explain this trend, such as increases in the prison population or number of police officials or

improved economic conditions. As a result, there is a missing piece in the puzzle, which they claim to be the effect of abortion legalization a quarter-century before the drop in crime.

Their argument supporting the impact of the legalization of abortion on the evolution of crime is based on several components. First, they analyze the timing of the legalization of abortion and the decline in crime. Five states legalized abortion in 1970, while abortion became legal throughout the US in 1973. It is then possible to compare the evolution of crime between the five pioneer states and the rest of the country. They observe that crime began to fall earlier in these five states than in the rest of the nation.

Second, they perform estimations to investigate the link between abortion and crime. Abortion is supposed to have an effect on crime beginning when aborted individuals would have been old enough to commit crime if not aborted. They take abortion into account through the effective abortion rate, defined as the abortion rate weighted by the age profile of the criminal population. To calculate this rate, they use information on the number of arrests by age. Crime measures are used for three crime categories: violent crime, property crime and murder.

Several panel data regressions are then performed on data from 1985 to 1996 at the state level. The dependent variable is the log of the number of crimes per capita. The independent variable of interest is the effective abortion rate. Control variables take into account the other possible factors driving crime: number of prisoners, number of police, economic conditions, state welfare generosity, existence of concealed handgun laws, and beer consumption. They find a negative impact of abortion on crime for each of the three crime categories. This effect has a high magnitude, as they attribute approximately half of the reduction in crime to the variation of abortion rate.

Two studies have provided evidence in accordance with these findings on the role of abortion on deviant behavior. Sorenson, Wiebe and Berk (2002) investigate a more immediate effect of the legalization of abortion by examining the evolution of the homicide of young children in the US. They find that the legalization of abortion in 1973 was associated with a reduction of the number of homicide victims for children less than 5 years of age in the subsequent years. Charles and Stephens (2006) provide evidence on the impact of abortion on substance abuse in the US by focusing on in utero exposure to legalized abortion. They show that adolescents born in the five states with early legalization of abortion were less likely to use controlled substances than adolescents born in other states.

However, several papers have presented critiques against the abortion-crime link stressed by Donohue and Levitt (2001).

Joyce (2004) makes several criticisms to which Donohue and Levitt (2004) reply. First, he argues that DL neglect illegal abortions in their approach by assigning a zero abortion rate for each year and state before the legalization of abortion. Indeed, most legal abortions in the early 1970s would have only replaced illegal abortions. As a consequence, no impact of legalized abortion should be observed. Donohue and Levitt (2004, p. 33) recognize that the number of illegal abortions is unknown, but they stress that "both theory and evidence, however, strongly suggest that the prevalence of abortion rose sharply after legalization". From theory, they observe that the reduction of the cost of abortion as a whole should lead to a rise in abortion rates. From empirics, they conclude that the simple replacement of illegal abortions by legal abortions cannot explain why the number of legal abortions increased strongly in the seven years following the legalization of abortion in the whole nation before reaching a steady state.

Second, he claims that the reported association between abortion and crime is the result of the changes in crack cocaine use, which is not correctly taken into account in the estimations of DL. Namely, the period of study of this latter research coincides with the massive epidemic of crack cocaine in the US, which has increased crime rates. However, the identification strategy does not include differences in within-state factors, such as the evolution of crack cocaine markets. He then redoes the estimations with a new identification strategy, leading to the absence of any link between abortion and crime. Donohue and Levitt (2004) provide a reply from a methodological perspective. They also note that the impact of crack cocaine was associated with violent crime but not with property crime, while both categories of crime are affected by abortion rates.

Foote and Goetz (2008) make two arguments against the latter finding from DL, according to which abortion would have an effect on arrests. Namely, DL conclude their paper by examining the impact of abortion on arrests by age of offender to provide additional evidence in favor of their key hypothesis. However, Foote and Goetz observe that DL do not estimate what they claim to estimate. First, DL claim to include state-year fixed effects in their estimations, but they do not. Second, DL pretend to use the arrest rate but actually adopt the number of arrests rate in practice. Foote and Goetz redo DL's estimations by taking into account these corrections and then do not find a reduction in crime due to legalized abortion.

Donohue and Levitt (2008) address these issues: they admit their errors but reply that corrections provided by Foote and Goetz are flawed by attenuation bias. They provide

additional estimations in which they also take into account the corrections and conclude that these new estimations also support the link between abortion and crime.

In the paragraphs above, we have reviewed the main works on the abortion-crime link, all of which use the US as the setting. A very small number of studies have also examined this issue in other settings.

Leigh and Wolfers (2000) examine the link between abortion and crime in Australia at the federal level. They observe a decline in crime during the 1990s, which they associate with the abortion policy taking effect 20 years prior. Thus, they provide evidence in accordance with DL's finding. However, this analysis is crude, as it is only based on a comparison of series over time, without greater examination of the relation. Nonetheless, it furnishes evidence of interest for the abortion-crime link for a country other than the US.

Pop-Eleches (2006) uses a unique natural experiment, the abortion ban in Romania in 1966, to analyze the effects of abortion ban. At first glance, the findings are not in line with the view that legalized abortion reduces deviant behavior. Birth rates increased dramatically after the policy implementation because of the increase in the number of children born by educated women, as these women were the most likely to have abortion. However, when considering the composition of women having children, the paper finds worse educational and labor market outcomes but also increased criminal behavior later in life for children born after the measure. These contrasted findings are explained by the difference between the short-term effects on educated women and the long-term effects on less educated women.

Kahane, Paton and Simmons (2007) investigate the hypothesis that legalizing abortion diminishes crime using data from England and Wales. They replicate the methodology from DL on these parts of UK with the help of data for the number of abortions and categories of crime by age of offender. The evidence is rather mixed. They observe a negative relationship between abortion rates and crime, in accordance with DL's findings for US data. However, this relationship does not survive robustness checks. The paper thus concludes that there is an absence of a clear relationship between abortion and crime in England and Wales.

Sen (2008) examines the link between abortion and crime using data from Canada from 1983 to 1998. Abortion was legalized in 1968 in this country, with its wide availability implemented in 1988. The analysis of Canada was of particular interest to verify the results obtained for the US, as both countries have similarities but Canada did not experience the crack wave of the late 1980s. He finds support for the effect of legalized abortion on crime with regard to violent crime but not property crime.

Buonanno et al. (2011) also assess the effect of abortion on crime using a broader analysis investigating the factors driving the evolution of crime in Europe and the US. They examine the role of five potential determinants of crime, including abortion, on a sample comprised of seven European countries and the US. To this end, they explain crime rates by distinguishing total crime, violent crime and property crime. Crime rates are regressed on a set of variables, including the share of aborted adults, which is defined as the number of aborted children in the past that would have been adults.

They do not find evidence in favor of the impact of abortion on crime, as the coefficient of the abortion variable is not significant in all estimations. However, as their perspective is broader than the focus on the role of abortion, they restrict their sample to seven European countries. Hence, they do not fully exploit the variation in dates of abortion legalization across Europe countries and the full information available on abortion rates in Europe. Moreover, they adopt a conservative approach by including country fixed effects, time fixed effects and country-specific time trends in the regressions. By doing so, country-specific time trends can capture all of the variation in abortion rates. The authors observe that, without this inclusion, they obtain a significant and negative impact of abortion on crime, in accordance with DL's finding.

3. Description of offenses and abortion in Western Europe

In this section, we describe the recent evolution of offenses and abortion in Western European countries.

3.1. Recent changes in theft and homicide

Our sample contains 16 Western European countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. The choice of these countries is based on the trade-off between the maximizing the number of countries included and ensuring the availability of the data. In other words, there is no endogenous criterion to select the observations despite the sample of countries not being randomly selected.

To measure crime, we use two variables. Both these measurements are *a priori* the most related to abortion. The first variable is the annual homicide rate defined per 100,000

inhabitants provided by the United Nations Office on Drugs and Crime[1]. Figure 1 depicts the national evolution of the homicide rate between 1990 and 2007.

First, we observe significant differences in the crime levels between countries. In particular, the homicide rate is the highest in Finland (between 2 and 3 per 100,000 inhabitants) and the lowest in Austria (less than 1 per 100,000 inhabitants) during the most recent period. Second, the evolution is different among different European countries. The homicide rate has been relatively stable in many countries, but it has increased in some countries, such as Belgium, and decreased in others, such as Switzerland. Overall, there is no common pattern for the evolution of homicide rates among European countries.

The second variable combines three variables initially provided by the European Sourcebook of Crime and Criminal Justice Statistics (see Aebi and Linde, 2010). We sum the three types of theft, theft, burglary and robbery, to limit the influence of the national definitions on our measure. We assume that the adoption of an aggregate measure strengthens the stability and robustness of our variable. Figure 2 presents the national evolution of the theft rate between 1990 and 2007. Similarly to homicide, we find large differences across European countries for both levels and trends. Over this period, the theft rate was generally stable in many countries, but it increased in Austria and decreased in Denmark, among other countries. It must be stressed that the period of observation is shorter for theft than homicide in several countries, such as Belgium or Spain, which explains the difference in the observation numbers between the estimates.

3.2. Abortion pattern and measurement

To measure abortion, we use national abortion statistics, defined as the number of abortions performed per year and provided by the World Health Organization. Figure 3 describes the national trends of abortion utilization (per live births). Once again, the curves vary in shape by country. In some nations, the level is stable (e.g., France, Switzerland), and in others, it decreases (e.g., Italy) or increases (e.g., Spain). In other words, there is no universal pattern for abortion in Europe, similarly to the case for homicide and theft. We also note that the abortion measures provided by the World Health Organization are not necessarily null before the formal authorization.[2] We do not have an explanation of this fact,

[1] The definitions and statistical sources of each variable are given in the appendix.

[2] We do it for Austria, Belgium, Denmark, Finland, Greece, Norway and the Netherlands.

but it limits the criticism based on cross-border abortions not being taken into account by the national figures.

Using these figures, we compute the accumulation of abortions from its legalization and until 15 years before the year studied and divide these sums by the current population. For instance, the abortion measurement for France in 2003 is the total number of abortions from 1975, the date of authorization, up to 1988 divided by the 2003 national population. Figure 4 depicts the national evolutions of our cumulated measure. We distinguish countries for which abortion was not legalized, such as Ireland, from those for which the legalization was very late, such as Spain, or highly limited, such as Portugal.

The main concern regarding this measure is that the concept of "legalization" is quite unclear. In several European countries, abortion has been incrementally legalized. The United Nations identifies seven grounds on which abortion may be permitted: to save the woman's life, to preserve physical health, to preserve mental health, in the case of rape or incest, for fetal impairment, for economic or social reasons and upon request.

Empirically, three steps are frequently observed in abortion legalization. First, abortion is allowed in the case of risk for maternal life or for the mother's (and sometimes child's) physical or mental health. Second, abortion is also allowed for socioeconomic reasons. Third, abortion becomes legal upon request. Each legal change should impact not only the number of abortions but also the reasons for which abortions are sought. The first threshold should increase abortions for medical reasons, which could impact future crime by decreasing the number of orphans. The second threshold triggers an increase in abortions for socio-economic reasons, which can improve the mean material conditions in which a child is raised and can also prevent crimes. Finally, the third threshold also includes the DL reasons: although the necessary socioeconomic and medical conditions are met, unwanted children are not born.

Distinguishing among these three thresholds allows us to avoid arbitrary choices about the date of legalization and to distinguish qualitative selections of children according to abortion motives. Table 1 provides the dates of legalization according to the definition of legal abortion.

Using these different dates, we distinguish among the starting dates used to compute the accumulation of abortions. Until the date, the number of abortions is null, and from this date, we sum up the number of abortions until 15 years before the observation year. These different measurements allow us to indirectly identify the reasons that explain the effect of abortion on offenses and crime by grounds for abortion.

4. Method

In this section, we present the method used to estimate the relationship between abortion and crime. Our dataset includes data on 16 Western European countries from 1990 to 2007. Due to missing observations, our panel is not balanced: we have 275 observations to explain the homicide rate and 222 observations to explain the theft rate.

We use five country-specific control variables in our estimations[3], which are selected in line with DL and the former literature on the determinants of crime (e.g., Fajnzylber, Lederman and Loayza, 2002).

First, we consider the annual number of prisoners per capita. The prisoners variable is the lagged by one (one year), as in Dills, Miron and Summers (2010). We use the lagged variable to eliminate the endogenous effect of the police and judicial work. Indeed, the causal relationship between crime and number of prisoners is not univocal: a higher crime rate induces a greater number of prisoners due to police work, and a greater number of prisoners reduces the crime rate because potential criminals are incarcerated and unable to engage in criminal behavior.

Second, we take into account two variables for the macroeconomic environment: the unemployment rate and the growth rate of GDP. Economic conditions influence crime by affecting the expected gains of legal activities relative to those of illegal activities. A large body of evidence supports the positive impact of unemployment rate on crime. Raphael and Winter-Ebmer (2001) for the US and Altindag (2012) for Europe find a positive effect of unemployment rate on property crime but no effect on homicide.

Third, we consider alcohol consumption per capita. There is overwhelming evidence of a positive link between alcohol and violent behavior (Parker and McCaffree, 2013). DL take this into account by considering beer consumption when explaining crime.

Finally, we control for the share of young males (from 15 to 24 years) in the overall population. This demographic variable has been shown to play a major role in crime, as young males are the subpopulation with the greatest likelihood of committing offences. This variable is of particular interest in our estimations because it is the first channel by which abortion could influence crime.

[3] The definition and source of the variables are given in the appendix.

We propose three empirical models: the first includes all variables (model A), while the second and the third successively exclude the share of young males (model B) and the abortion measure (model C). The use of three alternative models has two motivations. First, we aim to test the incidence of control variables without abortion. Second, we want to distinguish the quantitative (cohort-size) and the qualitative (selection) effect of abortion legalization on crime. According to the first effect, legalizing abortion reduces the *proportion* of young people in the population. This cohort-size effect assumes two hypotheses well documented in the literature: allowing abortion reduces the fertility rate (Levine et al., 1999), and young people are more likely to commit crimes (Farrington, 2003). The selection effect argues that legalizing abortion selects a *type* of people because individuals who would have lived in destitute conditions or with negligent parents are aborted. In the case of a limited right to abort, people with health conditions or those who live under difficult socioeconomic conditions are the only ones allowed to abort, and thus the selection is operated by law. When the abortion is upon request, the selection is operated by mothers, who are assumed to know better than anyone else under which conditions they are able to raise a child. This link between a mother's pregnancy intentions and a child's delinquency has been shown, even though it is very small (Hay and Evans, 2006). Thus, in model B, both cohort-size and selection effects are captured by the number of abortions, while in model A, each effect is estimated separately. This allows us to determine the impact of both effects.

Regarding the abortion variable, we use two steps in our estimations. In a first step, we carry out the overall measurement of abortion corresponding to the data given by the World Health Organization. In a second step, we discriminate the number of abortions according to the date of the legalization type, as previously defined.

The econometric concern addresses the usual issues linked to the panel data estimation. In a first stage, we run a classical OLS, but a problem of error autocorrelation arises. Indeed, the Wooldridge test (Wooldridge, 2002) clearly shows that our estimations suffer from serial autocorrelation[4]. As a result, we use the method of Baltagi and Wu (Baltagi and Wu, 1999) to correct the error variance matrix, allowing the autocorrelation issue to be eliminated. Because we do not have invariant explanatory variables and because the model with random effects necessitates a stronger assumption about the relationship between the error terms and the country effects, we prefer to carry out fixed effects estimates.

[4] The results of the Wald test for the homicide rate and theft rate are $F(1,15)=17.85$ ($p<0.001$) and $F(1,14)=19.32$ ($p<0.001$), respectively.

5. Results

The main estimations for the homicide rate and the theft rate are given in Tables 2 and 3, respectively. We note that the explanatory power of the model is much higher for the theft rate than the homicide rate. For model A, which has a larger set of explaining variables, besides abortion, only one explaining variable has a significant coefficient with the homicide rate, whereas four explaining variables have significant coefficients with the theft rate.

The key finding is the negative impact of abortion on crime. The coefficient of the abortion variable is negative and significant at the 1 percent level in all estimations for the homicide and theft rates. This result is not influenced by the presence of the share of young males (model B). In other words, the accumulation of abortions implemented more than 15 years ago contributes to the reduction in both the homicide and theft rates. Therefore, our main conclusion is that abortion has a negative influence on crime. This finding is in agreement with the results obtained by Donohue and Levitt (2001) in the US.

The magnitude is higher for homicide than theft: an increase of 1% in the accumulation of abortions leads to a decrease of 0.16% in the theft measurement and 0.24% in the homicide rate.

We now turn to the analysis of the control variables. From a broader perspective, we observe that alcohol consumption exerts a significant effect on the homicide rate but not on the theft rate. In contrast, the four other control variables – unemployment, growth, share of young males and number of prisoners - only have a significant effect on the theft rate. This suggests to some extent that homicides in European countries are more associated with psychological illness, while thefts are influenced by social and economic conditions.

Furthermore, the coefficients of the control variables have the expected signs. These effects are robust and do not depend on the inclusion of the abortion variable or the share of young males, as the sign and significance of the coefficients do not change when we exclude these variables (models B and C).

Namely, alcohol consumption has a positive and significant impact on the homicide rate, which is in line with the expectation that alcohol increases violent behavior.

The prisoners variable is significantly positive when explaining the theft rate, meaning that greater incarceration reduces property crime. This finding is in accordance with the view that incarceration contributes to preventing potential criminals from being able to commit crimes.

Unemployment rate and growth rate exert a positive effect and a negative effect, respectively, on the theft rate. These findings are in agreement with the fact that deteriorating economic conditions favor property crime. DL also find that unemployment is associated with increases in property crime but not murder.

We deepen our analysis by comparing the respective impact of the cohort-size and selection effects to gain a better understanding of the mechanism through which abortion influences crime. First, we do not find evidence of the effect of the share of young males on homicides, even when abortion is not controlled for (Model C). Therefore, the cohort-size effect is invalidated. However, the selection effect is observed, doubling the R^2.

Regarding theft rate, both cohort-size and selection effects are confirmed. The share of young males impacts crime (Models A and C). Moreover, in comparison to Model B, the coefficient of the abortion variable in Model A decreases when the share of young males is controlled for. This result suggests that in Model B, the abortion variable captures both cohort-size and selection effects, while in Model A, the abortion variable measures only the selection effect. Regarding the R^2, the cohort-size effect improves the model by 3%, while the improvement is improved by 10% when the selection effect is introduced. Overall, the selection effect contributes substantially to explaining both homicides and thefts.

Tables 4 and 5 present the findings using different calculations of the accumulation of abortion for the two types of offenses. While the definition of abortion does not affect the impact on the homicide rate, it does affect the impact on the theft rate. Less liberal regulation and the intermediate threshold of the abortion always have a negative effect on theft rate, even though the coefficient is greater for the latter. In terms of elasticity, the magnitude is slightly greater for the first measurement of abortion (-0.14%) than for the second (-0.13%). However, more surprisingly, the last measurement has no significant impact on the theft rate. In other words, the effect of abortion incidence on theft disappears with the more liberal use of abortion.

This result allows us to specify the selection mechanism, at least for thefts only. Legalizing abortion only for medical and socioeconomic reasons is sufficient to ensure that the conditions in childhood associated with theft perpetration later in life are filtered. The date of the last legalization stage – abortion on request – does not affect thefts. This finding deserves further testing in the US, where abortion in the case of danger to the woman's health or likely damage to the fetus was legal in 13 states before the famous Roe v. Wade decision.

We perform some robustness checks for our main estimations. We use an alternative measure for the abortion variable by moving the upper limit of abortion. Instead of the measurement of accumulation of abortion until 15 years ago, we consider the threshold of 18 years. Table 6 displays these results. We again find that abortion exerts a negative influence on the homicide rate and the theft rate. We also carry out a generalized least squares model assuming random effects for countries (results not reported for space reasons). The sign and significance of the abortion variable is not altered. Hence, our main finding of a negative influence of abortion on crime survives the robustness checks.

6. Conclusion

The publication of Donohue and Levitt (2001)'s paper on the impact of legalized abortion on the decline of crime in the US has created a wide debate in the literature. We contribute to this debate by using cross-country data on 16 European countries with different dates for abortion legalization to investigate this issue. We are then able to provide a different view than single-country studies, which have provided conflicting findings.

We confirm the negative impact of abortion on crime for both homicides and thefts, although the magnitude of this impact is much smaller than that reported by Donohue and Levitt for the US. Moreover, we provide evidence in favor of the selection effect – rather than the cohort-size effect. Legalizing abortion decreases crime because abortion selects well-raised children and not because it reduces fertility. We also provide relevant findings for the effects of the types of legalization. We show that legalizing abortion only for medical or socioeconomic reasons is sufficient to decrease theft. The last step – full legalization – ceases to affect thefts but remains significant for homicides. This piece of evidence suggests that unwantedness alone does not lead to high crime, but unwantedness and objectively unfavorable conditions do.

Our paper provides relevant findings for the understanding of the determinants of delinquency in Europe. We support the view that legalizing abortion should be considered when studying the evolution of crime in Europe. We in no way claim that abortion should be legalized to reduce crime; we only argue from an observer's perspective that such legalization weakens crime.

References

Aebi, M., and A. Linde, 2010. Is There a Crime Drop in Western Europe? European Journal on Criminal Policy and Research 16, 4, 251–277.

Altindag, D.T., 2012. Crime and Unemployment: Evidence from Europe. International Review of Law and Economics 32, 1, 145-157.

Baltagi, B. H., and P. X. Wu. 1999. Unequally Spaced Panel Data Regressions with AR(1) Disturbances. Econometric Theory 15, 814–823.

Buonnano, P., Drago, F., Galbiati, R., and G. Zanella, 2011. Crime in Europe and the United States: Dissecting the 'Reversal of Misfortunes', Economic Policy, July, 347–385.

Charles, K. and M. Stephens, 2006. Abortion Legalization and Adolescent Substance Use. Journal of Law and Economics 49, 2, 481-505.

Dills, A., Miron, J., and G. Summers, 2010. What Do Economics Know About Crime? In: The Economics of Crime: Lessons for and from Latin America. University of Chicago Press, 269-302.

Donohue, J., and S. Levitt, 2001. The Impact of Legalized Abortion on Crime, Quarterly Journal of Economics 116, 2, 379–420.

Donohue, J., and S. Levitt, 2004. Further Evidence that Legalized Abortion Lowered Crime: A Reply to Joyce, Journal of Human Resources 39, 1, 29–49.

Donohue, J., and S. Levitt, 2008. Measurement Error, Legalized Abortion, and the Decline in Crime: A Response to Foote and Goetz, Quarterly Journal of Economics 123, 1, 425–440.

Fajnzylber, P., Lederman, D., and N. Loayza, 2003. What Causes Violent Crime? European Economic Review 46, 1323-1357.

Farrington, D. P., 2003. Developmental and Life-Course Criminology: Key Theoretical and Empirical Issues –The 2002 Sutherland Award Address. Criminology 41, 2, 221–255.

Foote, C., and C. Goetz, 2008. The Impact of Legalized Abortion on Crime: Comment, Quarterly Journal of Economics 123, 1, 407–423.

Hay, C., and M. Evans, 2006. Has Roe v. Wade Reduced U.S. Crimes Rates? Journal of Research in Crime and Development 43, 1, 36–66

Joyce, T., 2004. Did Legalized Abortion Lower Crime? Journal of Human Resources 39, 1, 1–28.

Joyce, T., 2010. Abortion and Crime: A Review. In The Handbook of the Economics of Crime (eds: B. Benson and P. Zimmerman), Edward Elgar, New York, 452–487.

Kahane, L., Paton, D., and R. Simmons, 2007. The Abortion-Crime Link: Evidence from England and Wales, Economica 75, 1–21.

Leigh, A. and J. Wolfers, 2000. Abortion and Crime, AQ: Journal of Contemporary Analysis 72, 28–30.

Levine, P., Staiger, D., Kane, T. and D. Zimmerman, 1999. Roe v. Wade and American Fertility. American Journal of Public Health 89, 2, 199–203.

Levitt, S. and S. Dubner, 2005. Freakonomics: A Rogue Economist Explores the Hidden Side of Everything. Harper Collins, New York.

Parker, R.N., and K. McCaffree, 2013. Alcohol and Violence: The Nature of the Relationship and the Promise of Prevention. Lexington Books.

Pop-Eleches, C., 2006. The Impact of a Change in Abortion Regime on Socio-Economic Outcomes of Children, Journal of Political Economy 114, 4, 744–773.

Raphael, S. and R. Winter-Ebmer, 2001. Identifying the Effect of Unemployment on Crime. Journal of Law and Economics 44, 1, 259-283.

Sen, A., 2007. Does Increased Abortion Lead to Lower Crime? Evaluating the Relationship between Crime, Abortion and Fertility? The B.E. Journal of Economic Analysis and Policy 7, 1, 48-70.

Sorenson, S., Wiebe, D. and R. Berk, 2002. Legalized Abortion and the Homicide of Young Children: An Empirical Investigation. Analyses of Social Issues and Public Policy 2, 239–252.

Wooldridge, J. M. 2002. Econometric Analysis of Cross Section and Panel Data. Cambridge, MA: MIT Press.

Table 1
National abortion regulations

This table provides the years of abortion liberalization for the three types of legalization. Date 1 is for abortion authorized if the mother's health is threatened. Date 2 is for abortion authorized for socio-economic reasons. Date 3 is for abortion authorized without condition. Source: United Nations.

	Year of abortion liberalisation		
Country	Date 1	Date 2	Date 3
Austria	1974	1974	1974
Belgium	1990	1990	1990
Denmark	1956	1956	1973
Finland	1950	1970	-
France	1975	1975	1975
Germany	1975	1975	1975
Greece	1978	1986	1986
Ireland	-	-	-
Italy	1978	1978	1978
Netherlands	1984	1984	1984
Norway	1964	1978	1978
Portugal	1984	1984	1984
Spain	1985	2010	2010
Sweden	1938	1974	1974
Switzerland	1937	2002	-
United Kingdom	1967	1967	-

Table 2
Estimations of the homicide rate

Panel estimations with country fixed effects. Dependent variable is the homicide rate. Standard errors are in brackets. *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level. Rho : estimation of the serial autocorrelation coefficient of the error terms. Estimations with AR(1) disturbances, Baltagi and Wu correction.

Model	A	B	C
Abortion measurement	-10.8*** (3.21)	-11.0*** (3.18)	-
% young males	7.25 (2.87)	-	4.04 (8.03)
Prisoners	-0.00091 (0.0022)	-0.00087 (0.0022)	-0.0034 (0.0022)
Unemployment rate	-0.0057 (0.012)	-0.0036 (0.011)	0.0077 (0.013)
Alcohol consumption	0.086** (0.034)	0.093*** (0.029)	0.10*** (0.036)
Growth rate of national income	0.0024 (0.0069)	0.0024 (0.0069)	0.0057 (0.0070)
Constant	0.63*** (0.16)	0.73*** (0.14)	0.11 0.15
Rho	0.65	0.65	0.70
N	275	275	275
R^2 within	0.11	0.11	0.06

Table 3
Estimations of the theft rate

Panel estimations with country fixed effects. Dependent variable is the theft rate. Standard errors are in brackets. *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level. Rho : estimation of the serial autocorrelation coefficient of the error terms. Estimations with AR(1) disturbances, Baltagi and Wu correction.

Model	A	B	C
Abortion measurement	-31742.4*** (9076.8)	-34647.2*** (9832.2)	
% young males	37603.7** (17729.7)		44128.5** (20986.7)
Prisoners	-20.0*** (5.36)	-18.3*** (5.39)	-23.5*** (5.44)
Unemployment rate	68.4** (29.9)	86.0*** (29.1)	92.3*** (29.4)
Alcohol consumption	39.8 (76.5)	112.5 (70.7)	62.3 (79.0)
Growth rate of national income	-38.7** (17.4)	-36.3** (17.4)	-40.0** (16.9)
constant	4539.5*** (349.8)	6041.4*** (259.9)	2940.7*** (270.6)
rho	0.70	0.72	0.79
N	222	222	222
R^2 within	0.27	0.24	0.17

Table 4
Estimations of homicide rate according the criteria of abortion

Panel estimations with country fixed effects. Dependent variable is the homicide rate. Standard errors are in brackets. *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level. Rho : estimation of the serial autocorrelation coefficient of the error terms. Estimations with AR(1) disturbances, Baltagi and Wu correction.

Model	A			B		
Abortion :						
date 1	-11.4*** (3.13)			-11.5*** (3.09)		
date 2		-12.1*** (3.63)			-12.2*** (3.58)	
date 3			-11.1*** (4.00)			-11.2*** 3.92)
% young males	3.16 (7.12)	2.23 (7.20)	1.32 (7.33)			
Prisoners	-0.00088 (0.0021)	-0.00071 (0.0022)	-0.0020 (0.0021)	-0.00084 (0.0021)	-0.00068 (0.0022)	-0.0020 0.0021)
Unemployment rate	-0.0066 (0.012)	-0.0065 (0.013)	-0.000040 (0.012)	-0.0043 (0.011)	-0.0049 (0.011)	0.00093 0.011
Alcohol consumption	0.086** (0.034)	0.096*** (0.034)	0.090*** (0.034)	0.093*** (0.029)	0.10*** (0.029)	0.093*** 0.030)
Growth rate of national income	0.0020 (0.0069)	0.00056 (0.0070)	0.0031 (0.0070)	0.0020 (0.0069)	0.00052 (0.0070)	0.0030 0.0069)
constant	0.59*** (0.16)	0.47*** (0.16)	0.54*** (0.17)	0.70*** (0.14)	0.55*** (0.13)	0.59*** 0.14)
rho	0.64	0.64	0.64	0.64	0.64	0.64
N	275	275	275	275	275	275
R^2 within	0.12	0.11	0.10	0.12	0.11	0.10

Table 5
Estimations of theft rate according the criteria of abortion

Panel estimations with country fixed effects. Dependent variable is the theft rate. Standard errors are in brackets. *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level. Rho : estimation of the serial autocorrelation coefficient of the error terms. Estimations with AR(1) disturbances, Baltagi and Wu correction.

Model	A			B		
Abortion :						
date 1	-33048.1*** (9102.8)			-35879.1*** (9711.2)		
date 2		-41358.5*** (12318.9)			-45317.1*** (12789.0)	
date 3			-12536.7 (16913.7)			-17229.5 (16891.3)
% young males	37447.7** (17689.9)	37069.4** (18623.6)	42488.7** (20879.9)			
Prisoners	-20.4*** (5.30)	-19.2*** (5.48)	-23.0*** (5.52)	-18.7*** (5.33)	-17.2*** (5.45)	-20.9*** (5.46)
Unemployment rate	67.1** (29.9)	60.9** (30.7)	88.7*** (30.0)	84.7*** (29.0)	74.4** (30.1)	100.3*** (29.7)
Alcohol consumption	35.6 (76.4)	59.8 (76.7)	57.2 (79.3)	107.2 (70.5)	120.4* (71.2)	110.4 (75.5)
Growth rate of national income	-39.2** (17.4)	-42.0** (17.1)	-40.1** (17.0)	-37.1** (17.3)	-40.3** (17.1)	-38.8** (17.1)
Constant	4530.4*** (347.4)	4200.1*** (320.5)	42488.7** (20879.9)	6017.6*** (260.8)	5785.3*** (235.6)	5216.5*** (210.8)
Rho	0.70	0.73	0.78	0.72	0.74	0.78
N	222	222	222	222	222	222
R^2 within	0.27	0.25	0.18	0.24	0.23	0.16

Table 6
Additional estimations with abortion measured until 18 years ago

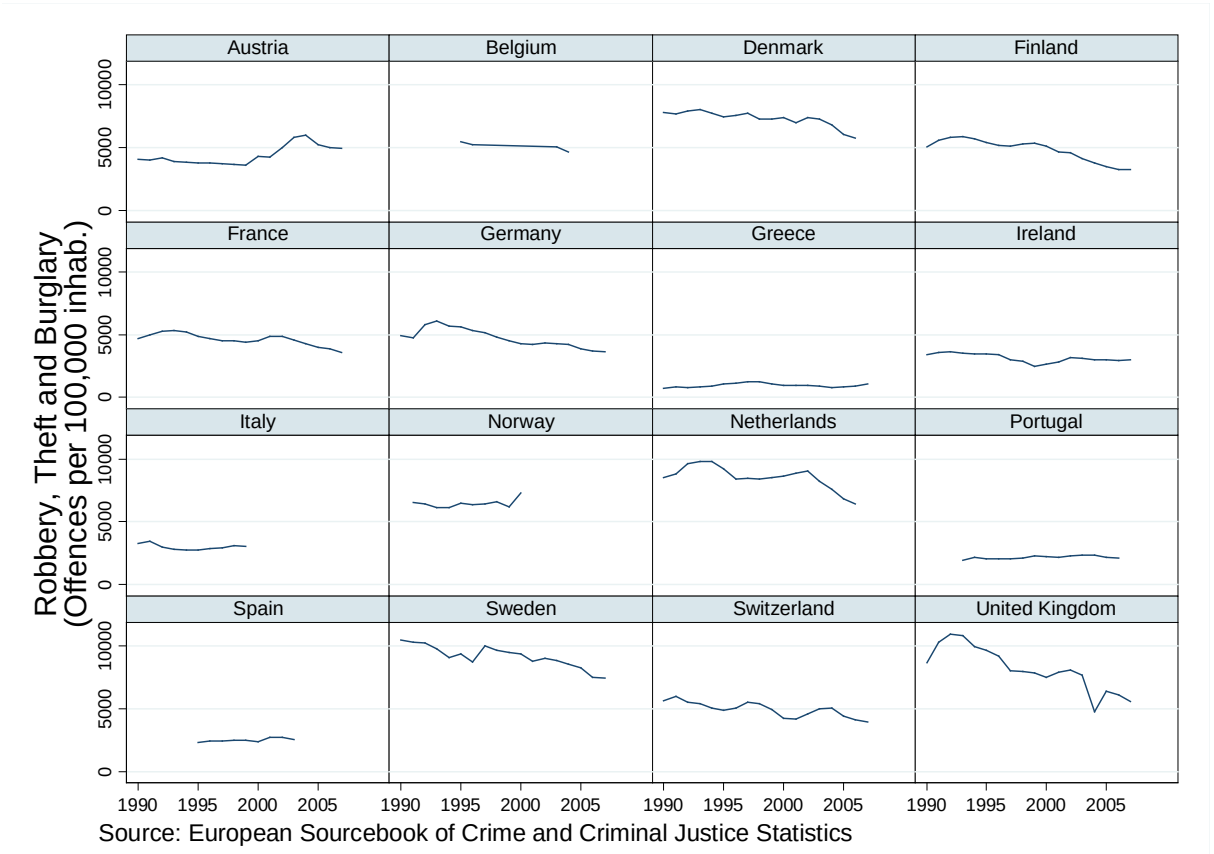
Panel estimations with country fixed effects. Standard errors are in brackets. *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level. Rho : estimation of the serial autocorrelation coefficient of the error terms. Estimations with AR(1) disturbances, Baltagi and Wu correction. We consider the Model A including all explaining variables.

Explained variable	Homicide rate	Theft rate
Abortion (18 years)	-11.5*** (3.04)	-33821.0*** (9416.8)
% young males	2.76 (7.18)	39629.6** (18267.5)
Prisoners per inhab. (lagged)	-0.00077 (0.0021)	-19.7*** (5.37)
Unemployment rate	-0.0075 (0.012)	63.8** (30.1)
Alcohol consumption	0.084** (0.034)	40.0 (76.6)
Growth rate of national income	0.0017 (0.0069)	-37.9** (17.1)
Constant	0.61*** (0.16)	4283.7*** (324.6)
Rho	0.64	0.72
N	275	222
R^2 within / between	0.12 / 0.08	0.26 / 0.28

Figure 1
National homicides rates

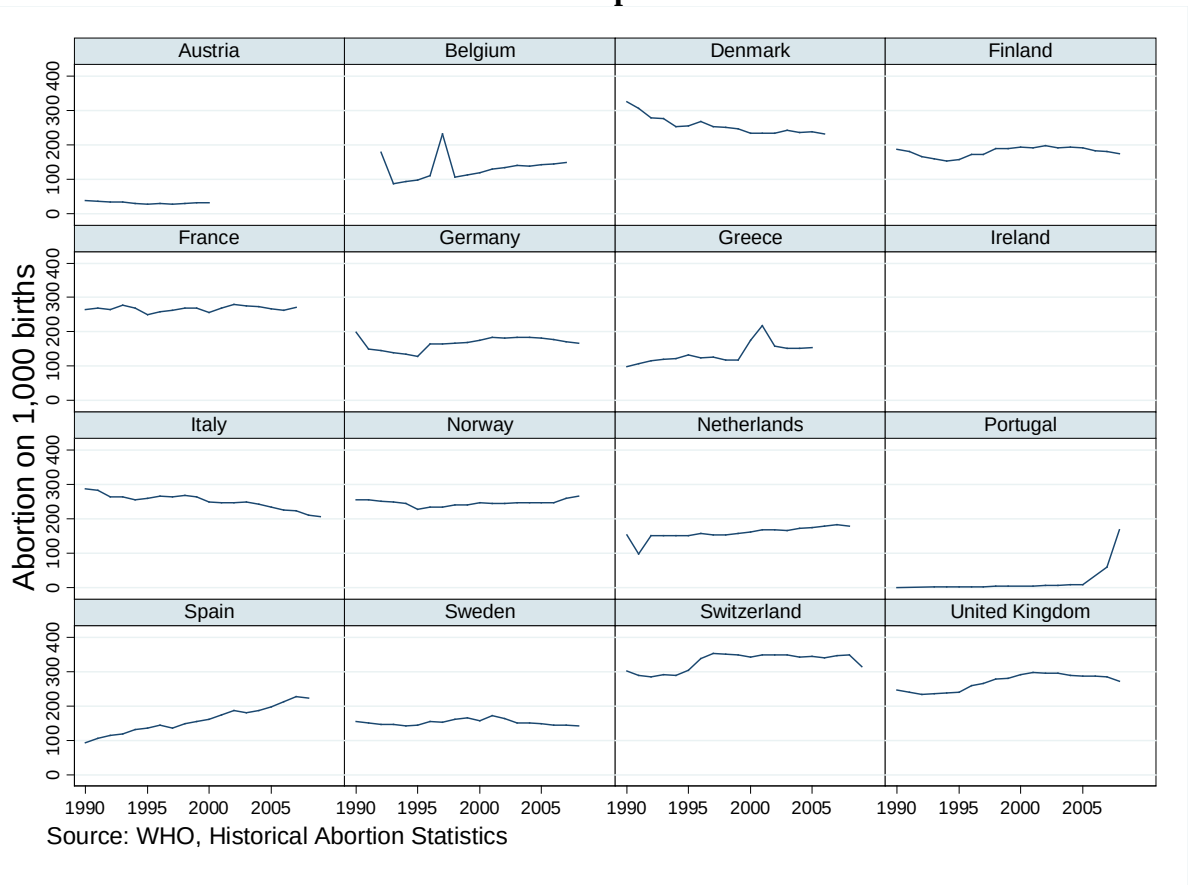
Source: United Nation office on drugs and crime

Figure 2
National rate of robbery, theft and burglary



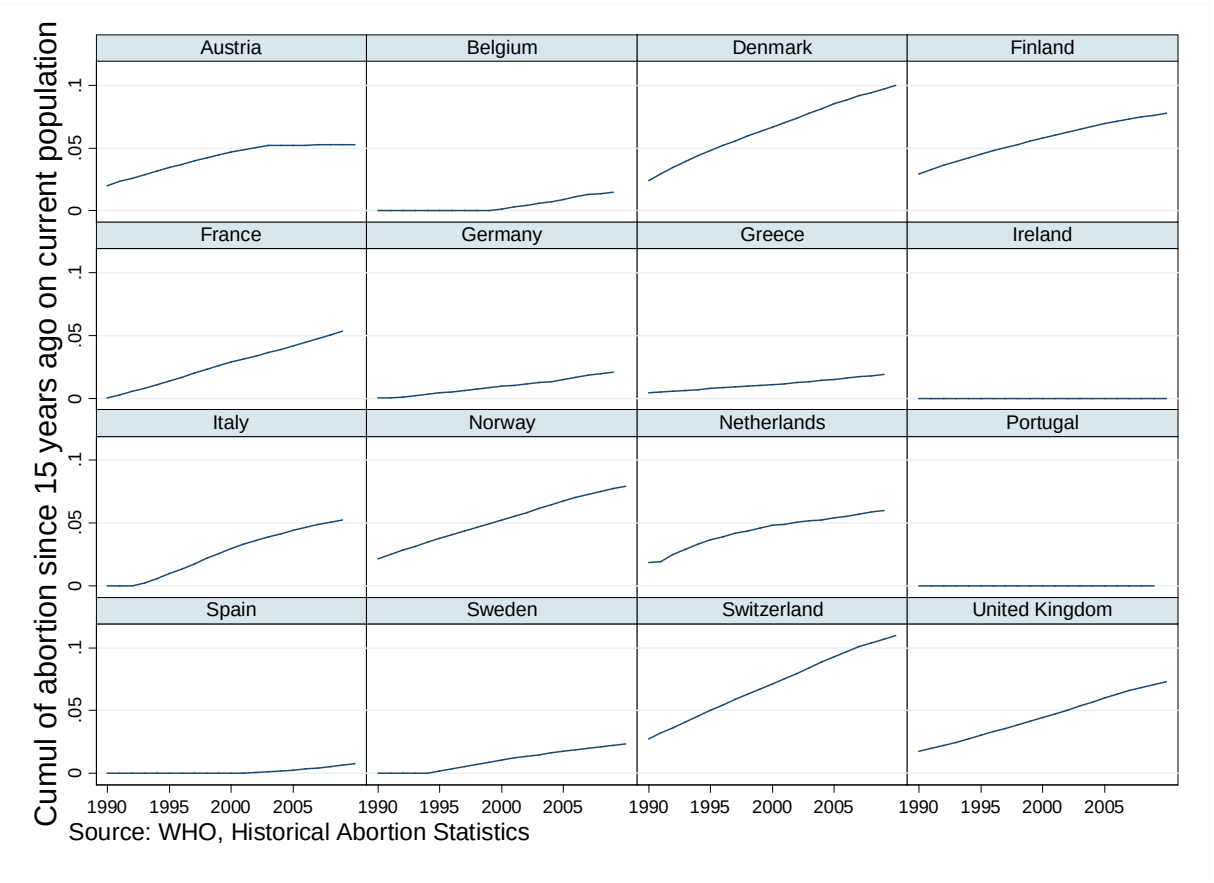
Source: European Sourcebook of Crime and Criminal Justice Statistics

Figure 3
National abortion per live births



Source: WHO, Historical Abortion Statistics

Figure 4
Accumulation of abortion until 15 years before (per current population)



Appendix
Description of variables

Variable	Definition	Source	N	Mean	s.d.	Min	Max
Homicide Rate	Intentional homicides, UN Crime Trends Survey (CTS) source (per 100,000 people)	United Nations office on drugs and crime	291	1.27	0.56	0.5	3.4
Theft Rate	Sum of robbery, theft and burglary per 100,000 population	European Sourcebook of Crime and Criminal Justice Statistics	238	5185.1	2495.6	707	10958
Abortion	Accumulation of abortions from its legalization and until 15 years before on current population	WHO, Historical Abortion Statistics	291	0.03	0.03	0	0.10
Abortion (18 years)	Accumulation of abortions from its legalization and until 18 years before on current population	WHO, Historical Abortion Statistics	291	0.02	0.02	0	0.09
% of young males	Share in the population of the males between 15 and 24 years old	World Bank : World Development Indicators	291	0.07	0.01	0.05	0.09
Prisoners	Annual number of prisoners per inhabitants. This variable is lagged of one year.	Eurostat	291	82.27	22.17	43.83	152.87
Unemployment rate	Unemployment, total (% of total labor force)	World Bank : World Development Indicators	291	7.57	3.84	1.7	23.9
Alcohol consumption	Recorded adult (15+ years) per capita consumption in liters	WHO, Global Information System in Alcohol and Health (GISAH)	291	10.66	2.50	4.55	16.07
Growth rate of national income	Annual change (in %) of the GDP per capita, PPP (constant 2005 international $)	World Bank : World Development Indicators	291	1.82	2.30	-8.64	10.35

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