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Abstract

This paper presents evidence on how the consumption of legal and illegal drugs has changed in response to the Great Recession in Spain. We use a large scale survey from 2005 to 2011 to analyze the association between changes in local economic conditions and drug consumption among individuals aged 15 to 64. Although Spain was one of the countries hardest hit by the economic downturn, the crisis was unevenly felt across the country. Therefore, we exploit this difference in unemployment rates across provinces to identify the effects of business cycle variations on the consumption of legal and illegal drugs. To the best of our knowledge, this is the first study to find a relation between the deterioration of local economic conditions and a strong increase in the consumption of marihuana and cocaine. We also report a decrease in alcohol consumption but a significant escalation in abusive smoking behavior (smoking every day). We believe that these findings are important not only for the potential negative implications at the individual level but also for the costs to society as a whole.

Keywords: business cycle fluctuations, drug consumption, economic crisis

1. Introduction

Drug use is a highly addictive behavior that many authors have used rational addiction models to understand (Becker and Murphy (1988), Orphanides and Zervos (1995), Grossman et al. (1998), Baltagi and Geishecker (2006), among others). However, several other factors can affect the probability of consuming drugs such as prices, economic conditions, and levels of education. This paper focuses on the impact of business cycle conditions on drug consumption behavior in Spain.

Although several studies have looked at the links between business cycle fluctuations and drug consumption, the results have been mixed and inconclusive. Economic fluctuations can translate into changes in drug consumption patterns through a variety of mechanisms. Based on the theoretical literature, changes in economic conditions could affect individuals' use of drugs in at least three ways. First, those who become unemployed during downturns will suffer a loss in income (income effect). As income decreases, individuals will reduce their consumption of normal goods. Thus, assuming that drugs act as normal goods, their consumption should decrease during economic downturns. Therefore, following the income effect hypothesis, we expect that drug consumption behaviour will respond in a pro-cyclical manner. Second, the prospect of losing one's job and uncertainty about future income can increase worker stress (economic stress), which can lead to increased drug consumption. The economic stress argument suggests that drug consumption will follow a counter-cyclical pattern. Third, loss of work will increase an individual's non-working hours (substitution effect). Additional leisure time may lead to increases in drug consumption, contributing to the counter-cyclical behavior of drug consumption. Thus, the effects of the economic cycle on drug consumption could be pro-cyclical, counter-cyclical, or unrelated to business cycle conditions depending on which of these theoretical effects dominates for each individual.

To test these theoretical arguments, a number of papers have estimated the relation between business cycle conditions and drug consumption empirically in various countries and time periods. A large group of authors have found drug consumption to behave pro-cyclically (see, for example, Eyer (1977, 1984), Hawkins et al. (1992), Ruhm (1995, 1996, 2005), Ettner (1997), Freeman (1999), Dee (2001), Ruhm and Black

(2002), Neumayer (2004), Granados (2005), Ruhm and Gerdtham (2006), Johansson et al. (2006), Charles and DeCicca (2008), Goldman-Mellor et al. (2011), Arkes (2012), Ásgeirsdóttir et al. (2012), Dávalos et al. (2012), Xu (2012), and Kokkevi et al. (2014), among others). For example, Ruhm (1995) finds a negative relation between unemployment rate increases and alcohol consumption, with spirits being the most sensitive alcohol type to business cycle conditions. In a follow-up study, Ruhm (1996) finds a negative relation between some causes of death related to drug consumption and the unemployment rate, pointing to a positive relation between business cycle conditions and mortality. However, he is not able to establish a direct link between drug consumption and business cycle conditions. Finally, in a 2005 study, he provides evidence, for the first time, of a negative relation between the unemployment rate and smoking (as well as some additional health-related problems). Furthermore, he finds that men show worse health deterioration than women.[1] Other authors find similar results using more recent data. For example, Xu (2012) studies the relations among wages, the number of hours worked, and health-related behaviors. These health-related behaviors are strongly correlated with the consumption of drugs, particularly smoking. Focusing on individuals in the United States with low levels of education, he concludes that more hours worked is positively related to more smoking and thus to poorer health.

Another stream of the literature examines whether drug consumption behaves counter-cyclically. Because a recession not only reduces income but can also lead to mental health issues such as depression, individuals may be inclined to consume more harmful substances like drugs. A smaller number of papers have found empirical evidence of the counter-cyclical behavior of drug consumption (see Dee and Evans (2003), Eibner and Evans (2005), Arkes (2007, 2012), Bockerman and Ilmakunnas (2007), Deb et al. (2011), Bradford and Lastrapes (2014), Compton et al. (2014), Aguilar-Palacio et al. (2015), Colell et al. (2015), Currie and Tekin (2015), and Golden and Perreira (2015), among others). For example, Arkes (2007) finds that marihuana behaves counter-cyclically and argues that individuals may turn to selling drugs during economic downturns, increasing access to marihuana. Other authors like Compton et al. (2014) analyze survey waves between 2002 and 2010 from the US National Survey on Drug Use and Health and find a weak counter-cyclical relationship in marihuana consumption

[1] He examines individuals aged 18 or older using the Behavioral Risk Factor Surveillance Survey (BRFSS) from 1987 and 2000.

among previous non-users. In the same direction, Colell et al. (2015) examine the frequency of sporadic and heavy marihuana use before and after Spain's economic crisis. Their findings suggest a counter-cyclical relation with sporadic marihuana use for both genders, but they find no association between heavy marihuana use and unemployment.

Most articles in this literature are only able to show an indirect relation between business cycle conditions and the consumption of drugs through the deterioration/improvement of an individual's health status. Such papers typically relate an economic expansion in the country with an improvement in the health condition of individuals stemming from a decrease in alcohol and tobacco consumption.

Finally, a recent strand of the literature focused on the Great Recession that began in 2008 finds evidence that the consumption of drugs is unrelated to the state of the economy (McInerny et al. (2013), Tekin et al. (2013), Ruhm (2015), among others). For example, Ruhm (2015), focusing on the years 2007–2009, finds no association between mortality and macroeconomic conditions. Thus, the pro-cyclical relation the author had found in previous research (Ruhm 1995, 1996 2005 and Ruhm and Black 2002) is no longer evident. Similarly, Tekin et al. (2013) examine whether drug consumption still behaves pro-cyclically in the United States by studying the relation between economic deterioration and health and health-related behaviors of individuals. As health behaviors, the authors include the consumption of tobacco and alcohol (differentiating between current drinkers, binge drinkers, and chronic alcohol users). Like Ruhm (2015), they conclude that even if differences across subpopulation groups remain, the relation between drug consumption and business cycle conditions has become virtually zero.

As these various results show, overall the literature on the relation between drug consumption and business cycle conditions is mixed. More studies have found a pro-cyclical relationship between the two but research focused on the most recent economic crisis mostly report no relation between the consumption of drugs and the state of the economy. Thus, this relationship may have changed over time or the peculiarities of the Great Recession may have altered the previous pro-cyclical pattern.

In this paper, we build on this recent literature by focusing on one of the countries

hardest hit by the Great Recession, Spain. Before the economic crisis, Spain had an unemployment rate similar to that of the full European Union (EU28) average (in 2005 Spain 9.2%, EU28 9.0%). However, the unemployment rate more than doubled in Spain during the recession while hardly changing in the EU28 (in 2011; Spain 21.4%, EU28 9.6%).[2] Spain now has the second highest unemployment rate in the Euro zone (after Greece), and unlike other European countries hard hit by the economic crisis, such as Portugal or Greece, Spain is the fifth most populous country in the EU28.[3] Due to Spain's size, the potential effects of the economic crisis on the consumption of drugs we explore may be relevant not only within the country but also for the EU as a whole.

To the best of our knowledge, this is the first study to analyze the effects of the Great Recession on drug consumption behavior by focusing on a hard hit European country (most other papers use US data). In addition, we extend the literature on how the business cycle affects drug use beyond legal drugs such as alcohol and tobacco by including several types of illegal drugs in our analysis. Most of the extant studies have focused on the effects of business cycle conditions on the consumption of legal drugs because of the difficulty of finding reliable data on the consumption of illegal drugs (although some of the papers include marihuana use). In this paper, we use a rich data set that includes both legal and illegal drugs and study whether the business cycle (proxied as the unemployment rate by province in Spain) has a differential effect on the consumption of both categories of drugs. Examining illegal drug use is an important addition to the literature because these hard drugs are the most harmful in terms of health consequences and mortality. In addition, some anecdotal evidence suggests that hard drug consumption increased during the Great Recession. For example, Hoffman (2014) shows that heroin-related deaths in New York increased by 84% from 2010 to 2012. We are able to add empirical evidence to these anecdotal facts.

We find substantial variation in the relation between business cyle fluctuations and drug consumption by type of drug. With respect to the legal drugs, our results support the prior literature that the probability of consuming alcohol in the past 12 months behaves

[2] Compared to neighboring country France, Spain felt the negative effects of the recession far more strongly. In 2005, the unemployment rate was almost the same in the two countries (Spain 9.2%, France 8.9%) but by 2011 the unemployment rate had increased by 12.2 percentage points in Spain and only by 0.3 percentage points in France.
[3] Data come from Eurostat.

pro-cyclically, but we find that the probability of smoking tobacco daily reacts counter-cyclically to changes in the economic condition. The consumption of marihuana and hard drugs (cocaine, crack, heroin, inhalants hallucinogens, and ecstasy) also behaves counter-cyclically. Because the reported incidence of hard drug use in our sample is very low, we are only able to identify the individual effect of two of these hard drugs, cocaine and ecstasy. We find that the consumption of cocaine increases with the economic crisis but that ecstasy consumption is not significantly related to changes in business cycle conditions. We perform several additional regressions to determine how drug consumption among several subgroups of our sample varies with business cycle conditions. We explore the heterogeneity in responses along several dimensions: the level of education, nationality, age, gender, labor market status and type of occupation (blue/white collar workers).

Because the consumption of both legal and illegal drugs has societal repercussions, our findings could be of use by policy makers in the design and timely implementation of anti-drug policies. It is widely acknowledged that the consumption of drugs not only jeopardizes the health of drug users but also poses a huge burden on non-drug users in terms of increases in the health care costs associated with drug use as well as higher mortality rates. According to the US Department of Justice's National Drug Intelligence Center (NDIC, 2011), the consumption of illicit drugs alone cost the US economy more than $193 billion in 2007. Finally, drug use has other important social costs, including higher crime rates and an increased burden on the criminal justice system. According to the US Department of Justice, 37% of almost 2 million convicted offenders currently in jail in the United States report that they were drinking at the time of their arrest.

2. Differential incidence of the economic crisis across Spanish regions

In contrast to some other countries, Spain suffered the recession on two fronts: through the effects of the global financial crisis and through the bursting of the construction bubble. The failure of major financial institutions in 2008 affected most European countries, including Spain. The global financial crisis caused the gross domestic product (GDP) to contract, along with a reduction in capital investment and a drop in domestic demand. Spain's GDP declined during the last half of 2008 for the first time in 15 years. At the height of the recession, Spain's GDP declined more than at any other time

since the contraction following the Civil War. In 2008, the country officially entered a recessionary period that ended in the second quarter of 2010. In the first quarter of 2009, the GDP growth rate was -3.7 and in the second quarter of 2010 it was -0.1, according to data from the Bank of Spain.

At the same time, Spain faced a construction crisis with the bursting of the so-called Spanish property bubble.[4] During the first half of the 2000s, rising housing prices in Spain led to the mass construction of new buildings. The Bank of Spain estimates that housing prices rose 100% in real terms between 1997 and 2006 (which is the equivalent of 150% in nominal prices) and 5 million new houses were built between 2000 and 2009.

Although these two events reinforced each other and exacerbated the effects of the economic downturn in Spain, the crisis was unevenly felt across the Spanish territory. The local economies of some regions in Spain were based around the construction sector, but others relied on other sectors such as services or manufacturing. Thus, when the bubble burst, some regions felt the impacts more strongly, and regional unemployment rates responded accordingly. Figure 1 shows that between 2005 and 2011, unemployment rates varied substantially across Spanish provinces, with some regions experiencing strong increases in unemployment while rates in others remained relatively low. In this paper, we use this differential impact of the Spanish economic crisis across provinces to identify the effects of a changing business cycle on drug consumption behavior.

3. Data and Sample Selection

Our analyses use two data sources. The first comes from the Spanish National Plan on Drugs (plan nacional sobre drogas), an initiative created in 1985 by the Spanish Ministry of Health, Social Services, and Equality to coordinate drug prevention policies carried out by different institutions in Spain. As part of its mandate, the initiative conducts a survey (EDADES) every other year. We use four years of survey data: two

[4] We acknowledge that Spain was not the only country to suffer a construction bubble, but we believe that the intensity of this bubble in Spain was generally stronger than in other countries. For example, between 2001 and 2008 in the United States, one new house was constructed for every 23.5 citizens. In Spain one new house was constructed for every 9.2 citizens during the same period.

pre-crisis years, 2005 and 2007, and two post-crisis years, 2009 and 2011. These four years do not constitute a panel but provide repeated cross-sectional data. These data allow us to estimate behavioral changes in drug consumption patterns based on business cycle conditions. The survey collects demographic data on all individuals in the sample as well as information on their consumption of both legal and illegal drugs. All information is self-reported by survey respondents, which can produce reliability problems. However, because we are interested in how answers change across the different waves and regions, any potential self-reporting bias is eliminated when looking at differences (to the extent that the self-reporting bias is consistent across waves in the regions and is not affected by business cycle conditions at the local level). We restrict the sample to individuals between the ages of 15 and 64.[5] The sample includes 27,400 individuals for 2005, 23,276 individuals for 2007, 19,713 for 2009, and 21,713 for 2011. To capture the effect of business cycle variations, we use province-level unemployment rates from the National Institute of Statistics for 2005, 2007, 2009, and 2011. We match the local unemployment rate to each individual in our sample based on where they live and the year of the survey.

The outcome variables in our models capture the consumption of both legal and illegal drugs: alcohol and tobacco (legal) and marihuana, cocaine, crack, inhalants, ecstasy, hallucinogens, and heroin (illegal). We group several illegal drugs—cocaine, crack, heroin, inhalants, hallucinogens, and ecstasy—under the variable "hard drug" because their consumption is very low, making it impossible to identify the effect on an individual basis. We also run separate regressions for the two most consumed hard drugs, cocaine and ecstasy, to identify the individual effects of each. The survey asks respondents whether they have consumed each of the drugs during the past 12 months as well as during the past 30 days.

The survey data also allow us to test whether the economic crisis had an influence on the abuse of legal drugs. The survey asks whether the individual has been drunk during the last 12 months or has smoked tobacco daily during the last 12 months. These questions allow us to investigate an additional dimension of legal drug use patterns (the abusive use of alcohol and tobacco). Finally, we also assess the impact of business cycle

[5] The survey is not administered to individuals below the age of 15.

conditions on the number of cigarettes smoked every day during the last 30 days. We are interested in whether drug consumption changes during economic downturns as well as whether economic conditions increase or decrease the abuse of legal drugs.[6]

Table 1 shows descriptive statistics (mean and standard deviation) of the dependent variables, and Table 2 presents the descriptive statistics of the independent variables included in our analysis. Table 1 shows huge differences in mean consumption of the various drugs. As expected, most people have consumed alcohol in the last 12 months (76.34% of the sample), and 31% of our sample reports smoking daily over the last 12 months. Not surprisingly, the percentage of individuals that have consumed illegal drugs in the last 12 months is much lower: 12% of the sample indicates marihuana use, and 3.06% and 1.2% used cocaine and ecstasy, respectively.[7]

4. Empirical Model

Because business cycle conditions could have differential impacts on the usage of various types of drugs, we distinguish between legal and illegal drugs in our analyses. For legal drugs, we look at the pattern of alcohol consumption in the last 12 months as well as abuse (smoking daily or getting drunk). For the legal drugs, we test the consumption of alcohol in the last 12 months, the probability of getting drunk in the last 12 months, and the probability of smoking daily over the last 12 months. For the illegal drugs, we test the probability of smoking marihuana in the last 12 months, the probability of consuming any of the hard drugs during the last 12 months, and the probabilities of consuming cocaine or ecstasy, in the last 12 months.[8] We repeat the same regressions for consumption in the last 30 days instead of the last 12 months.

As independent variables, we include controls for gender; age; age squared; being born in Spain; being in good health; having a university degree; being single, widowed, or divorced (married is the omitted category); and being a full-time student, a retiree, or a house worker. We include province and time fixed effects to control for any drug consumption pattern specific to each province as well as any yearly shock that might

[6] This question is only avaliable for the consumption of legal drugs.
[7] The percentages of individuals that report having tried the other hard drugs during the last 12 months are extremely low (around 0.02%) and are therefore not reported here.
[8] We also ran the model for the consumption of each of the other hard drugs individually—heroin, crack, amphetamines, inhalants, and hallucinogens—but the number of people reporting having used one of these hard drugs is too small to identify any significant effects.

have affected the consumption of drugs at the national level. Finally, we include our variable of interest, the unemployment rate of the province in which each individual lives in each year of the survey.[9,10] The differences in unemployment rates across Spanish provinces and over time allow us to identify the effects of business cycle variations on the consumption patterns of different types of drugs.

Our baseline logit model is:

$$Output_i=\beta_0+\beta_1 Man_i+\beta_2 Age_i+\beta_3 AgeSquared_i+\beta_4 GoodHealth_i+\beta_5 University_i+\beta_6 Single_i+\beta_7 Widow_i+\beta_8 Divorced_i++\beta_9 Student_i+\beta_{10} Retiree_i+\beta_{11} HouseWorker_i+\beta_{12} UrProvinces_i+\delta ProvinceFE_i+\mu YearsFE_i+\varepsilon_i$$

Results are presented as marginal effects instead of coefficients to facilitate the interpretation. We cluster the standard errors at the province level. Finally, we also run some models excluding a number of covariates to test the consistency of our results.

5. Results

Because our results vary by drug type, we present one section for each. In addition to distinguishing between legal and illegal drugs, we further divide the illegal drug results section into consumption of marihuana and consumption of other hard drugs because marihuana use (12%) is much higher than that of harder drugs (below 4%).

5.1 Legal drugs

Table 3 presents the results of our baseline model. Column 1 shows the results for the probability of consuming alcohol in the last 12 months. This is a dummy variable that takes a value of 1 if the individual has consumed alcohol at least once during the last year, and zero otherwise. In general, being Spanish-born, a male, older, more educated, or single or divorced are all associated with a higher probability of consuming alcohol in the past 12 months, whereas being a widow or a student, retiree, or house worker are both associated with a lower probability of alcohol consumption.[11] The province-level

[9] See the descriptive statistics of these explanatory variables in Table 2.
[10] Spain has 52 provinces. In our analyses, we group Ceuta and Melilla with Andalusia because they are too small to have enough observations as separate provinces.
[11] Of course, we do not make any causal claims between these covariates and drug consumption patterns; these are only associations between two variables.

unemployment rate is negative and significant, implying a pro-cyclical relation between alcohol consumption and business cycle conditions. More specifically, when the provincial unemployment rate increases by 10 percentage points, the probability of consuming alcohol in the past 12 months decreases by 3.4 percentage points.[12]

Columns 2 and 3 of Table 3 estimate the effects of business cycle conditions on abusive consumption of alcohol and tobacco. Although the consumption of alcohol in the last 12 months decreases when economic conditions deteriorate, the probability of getting drunk at least once during the last year is positive though not significant. Similarly, the probability of smoking tobacco daily during the last 12 months increases during an economic downturn: when the unemployment rate increases by 10 percentage points, the probability of smoking tobacco daily increases by 3 percentage points. These results provide evidence that regular and abusive consumption of these legal drugs differ during economic downturns: alcohol consumption behaves pro-cyclically, whereas the abusive consumption of tobacco, smoking daily, behaves in a countercyclical way.[13]

The last two columns of Table 3 show, respectively, the probability of consuming alcohol in the last 30 days and of drinking alcohol every day during the last 30 days. The coefficients are negative but not significant suggesting that individuals may need some time to change their habits in response to current economic conditions.

We next analyze which parts of the consumption distribution are most affected by business cycle conditions. Table 4 shows the results of an ordered probit model of the consumption of alcohol in the last 12 months. The dependent variable is divided into five outcomes: no consumption of alcohol in the last 12 months, consumed alcohol less than 20 days in the last year, consumed alcohol between 20 and 29 days in the last year, consumed alcohol between 30 and 150 days in the last year, or consumed alcohol on

[12] The unemployment rate is measured annually at the province level.
[13] We also ran estimations of the models in Table 3 but included province-specific linear trends in addition to the time and province fixed effects. In those regressions, the coefficients for the unemployment rate are not significant. However, we have several reasons to prefer the results in Table 3. Because we have four years of data, we are only capturing a period in which the unemployment rate shows an upward trend in all Spanish provinces. Several authors have argued that when there is a nationwide upward trend in all provinces, including province-specific linear trends jeopardizes the identification of differential effect of the economic crisis across provinces (see, for example, Chou et al. (2004) and Bockerman and Ilmakunnas (2007)). For this reason, the rest of the paper presents the results without province-specific linear trends.

more than 150 days in the last year.[14] Given a 10 percentage point increase in the local unemployment rate, the probability of not consuming any alcohol or consuming alcohol less than 20 days in the last year both increase (by 3 and 1.1 percentage points, respectively). In contrast, the probability of consuming alcohol between 20 and 29 days, between 30 and 150, or on more than 150 days during the last year decreases by 0.1, 1.7, and 2.3 percentage points, respectively, given a 10 percentage points increase in the unemployment rate. Thus, alcohol consumption declines as economic conditions deteriorate along the entire distribution, and the effect is strongest at the extremes: consuming no alcohol or consuming alcohol more than 150 days per year.

Table 5 presents the results of a continuous variable that captures the number of cigarettes (in the first column) or the number of cigarettes, pipes, and cigars (in the second column) smoked each day in the last 30 days. This model examines not only whether more people smoke every day as economic conditions deteriorate but also whether the number of cigarettes smoked per day increases. Because the data for these variables are strongly skewed to the right (due to the high concentration of zero values), estimation by OLS is inappropriate. Thus, we use count data models to assess the impact of business cycle conditions on the number of cigarettes smoked each day. We use three different models: the first uses a Poisson distribution (panel A of Table 5), the second a negative binomial distribution (panel B of Table 5), and the third a gamma distribution (panel C of Table 5). Figure 2 plots the dependent variable (number of cigarettes smoked each day) against a Poisson distribution (with the same mean) and against a negative binomial distribution (with the same mean and variance). The figure shows that the negative binomial distribution is better suited for our data (which is overdispersed). Thus, we focus on Panel B, which shows that a 10 percentage point increase in the provincial unemployment rate is associated with seven additional cigarettes smoked per day.[15]

[14] We cannot estimate the model using a continuous consumption variable because the possible survey responses only included those five categories.
[15] Although the negative binomial is our preferred model, the results are robust to changes in the distribution used in the analysis (see panels A, B, and C of Table 5).

5.2 Marihuana

Table 6 reports results for illegal drug consumption. Column 1 shows that the consumption of marihuana also responds to changes in local labor market conditions.[16] Unlike the pro-cyclical relationship found with regular alcohol consumption, consumption of marihuana and business cycle conditions display a countercyclical relation. The coefficient is positive and significant and estimates a 3.1 percentage point increase in the probability of using marihuana for each 10 percentage point increase in the unemployment rate of the region. That is, when local economic conditions deteriorate (and the unemployment rate increases), marihuana consumption increases.

5.3 Hard Drugs

Table 6, Column 2 presents the results for the consumption of hard drugs (crack, cocaine, heroin, ecstasy, hallucinogens, inhalants, and amphetamines) during the last 12 months. This variable equals one if the survey respondent indicates taking any of these hard drugs during the last 12 months. The coefficient on the unemployment rate is positive but not significant. To more precisely estimate the impacts on hard drugs, we re-run the same model for the two most commonly used hard drugs: the probability of having used cocaine (average consumption of 3% in our sample) or ecstasy (average consumption of 1.2%) in the last 12 months. The last two columns of Table 6 show that cocaine use grows by 1.2 percentage points for each 10 percentage point increase in the unemployment rate. Ecstasy consumption, in contrast, behaves pro-cyclically, with a decrease of 0.4 percentage points for each 10 percentage point increase in the unemployment rate, though the coefficient is not significant. These results point to a strong counter-cyclical pattern for cocaine and marihuana use and a nonsignificant pro-cyclical consumption pattern for ecstasy.[17] The differential effect of the economic crisis on the consumption of these drugs could stem from a variety of causes, including that the typical consumer of these drugs may differ or that the economic downturn could have affected the prices of these drugs differently. To further explore these results, in the next section we discuss the relation between drug consumption and economic conditions among subgroups of individuals in our sample.

[16] The variable that captures the consumption of marihuana equals one if the individual has consumed marihuana in the last 12 months.

[17] Table 7 shows the results for the consumption of these four illegal drugs in the last 30 days instead of the last 12 months. The coefficients are slightly smaller but still positive and significant for the consumption of marihuana and cocaine in the last 30 days.

6. Heterogeneous effects and robustness checks

We expect that business cycle conditions may affect drug use among some groups of individuals more than others. We next divide our sample by education level, employment status, immigration status, gender, and age, which prior research has shown can affect drug use (e.g., Ruhm (2003), Tekin (2004)). In addition, we further divide the subset of labor force participants (both employed and unemployed individuals) and perform separate analyses for white and blue collar workers.[18] We estimate a different model for each of the various subsamples to allow both the intercept and all the slope coefficients to vary across groups. This method provides more flexibility (as the determinants of drug consumption patterns can be different across groups) and is easier to interpret than the alternative model in which the variable of interest (unemployment rate) is interacted with the group variables (education level, age, gender, etc.). Note that estimating separate models for each group can result in a loss of statistical power. However, our sample contains a sufficient enough number of observations that we believe this is not a problem in our analysis.

Table 8 presents the results of the same baseline model but with the sample divided by individuals with/without a university degree and by immigration status. In general, our main results hold but are much stronger for more educated individuals and for the native population. That is, the main response in drug consumption behavior resulting from changes in the local economy appears to come from native individuals and those with a university degree.

Individuals with a university degree strongly increase their consumption of marihuana (4.2 percentage points) and of hard drugs (2.1 percentage points) in response to the deterioration of the economic condition in their provinces. Cocaine consumption increases by 1.7 percentage points for individuals with a university degree given a 10 percentage point increase in the local unemployment rate. At the same time, they are also very responsive in terms of decreasing their regular consumption of alcohol during the last 12 months (4.4 percentage points). On the other hand, less educated individuals only show a significant response to changes in local economic conditions in terms of

[18] Blue collar workers are those that perform manual labor, whereas white collar workers perform professional, managerial, or administrative work.

increasing the probability of smoking tobacco daily and increasing the consumption of marihuana and cocaine. With the exception of daily tobacco consumption, the size of these effects is always smaller for lower educated individuals.

The last two columns of Table 8 indicate that when the local economy deteriorates, the probability of marihuana use increases but the probability of consuming alcohol in the last 12 months decreases among those born in Spain. Similarly, both natives and immigrants increase the probability of smoking tobacco daily as well as their consumption of cocaine by, respectively, 1.2 and 1.6 percentage points for each 10 percentage point increase in the local unemployment rate.

To shed more light on the differential response across population groups, we further examine heterogeneity by gender and age. Table 9 presents the results for men and women, divided into three age groups: 15–30, 31–45 and 46–65.[19] With respect to the consumption of alcohol, we see that younger and older women are entirely driving the negative effect reported in Table 3. A 10 percentage point increase in the unemployment rate is associated with a 3.6 (7.8) percentage point drop in alcohol consumption among women ages 15–30 (46–65).

For the other drugs, the effects come primarily from men over age 30. The only exceptions are a significant decrease in the probability of consuming cocaine among young women (15-30) and a strong increase in the probability of smoking tobacco every day among young men (15-30). Men aged 31–45 strongly increase their probability of consuming marihuana and cocaine by 5.2 and 3.7 percentage points, respectively, for each 10 percentage point increase in the local unemployment rate, while those effects are 3 (marihuana) and 2.3 (cocaine) percentage points for the older group of men. Finally, as unemployment rises, the probability of consuming tobacco daily increases by 6.4 percentage points for men in the 46–65 age group.

Table 10 assesses the labor market status of survey respondents. We find stronger negative results among those most affected by the cycle, the unemployed. Among

[19] We distinguish between young, middle-aged, and older respondents because younger and middle-aged individuals felt the effects of the economic crisis strongest. Between 2005 and 2011, the unemployment rate increased by 26.8 percentage points among Spanish workers aged 15-25, by 12.19 percentage points for those aged 25-55, and by 8.39 percentage points for those 55+ (National Institute of Statistics).

unemployed individuals, the probability of getting drunk (6.8 percentage points), of smoking everyday (7.4 percentage points), of smoking marihuana (7.6 percentage points), of using cocaine (2.1 percentage points), and of taking ecstasy (0.9 percentage points) all increase substantially with increases in the local unemployment rate. As the unemployment rises, the probability of students smoking daily increases, but their probability of consuming ecstasy decreases. As the economy deteriorates, employed workers drink less alcohol but increase their consumption of marihuana and cocaine (although these negative effects are smaller in size than those reported for unemployed workers).

Finally, we find no important differential responses in drug consumption behavior between blue and white collar workers. Table 11 reports the results of the regressions by type of job. These regressions exclude students, house workers, and retired individuals as their occupation is not registered and, thus, the variable that captures the type of job cannot be constructed. In general, the coefficients are stronger for blue collar workers, suggesting that business cycle conditions have a stronger effect on drug consumption behavior among manual laborers.

These subgroup estimates indicate that the procyclical pattern of alcohol consumption is primarily driven by Spanish-born individuals, those with a university degree, women, and employed workers. However, the counter-cyclical nature of marihuana and cocaine use appears to be driven by men and individuals both with and without a college degree as well as those employed and unemployed. Finally, the increase in the probability of smoking daily is concentrated in men, individuals without a college degree, the unemployed, and students. The only group that shows a significant increase in the probability of getting drunk in the last 12 months as economic conditions deteriorate is unemployed workers, and this effect is quite strong (6.8 percentage points).

We test the robustness of our results to the concern that some of the covariates included in our model may be endogenous (such as house worker, student, retired, or good health). Thus, in Table 12 we perform the baseline regressions for the main outcomes but use fewer control variables. When we compare the results in Table 12 with those in Tables 3 and 6, we can see that the exclusion of some of the covariates does not change

any of the unemployment rate coefficients.[20]

7. Conclusions and policy implications

In this paper, we present empirical evidence on how the consumption of legal and illegal drugs changed as economic conditions deteriorated during the Great Recession in Spain. We use four years of data from a large-scale survey covering 2005 to 2011 to analyze the effects of changes in local economic conditions on drug consumption among individuals aged 15 to 64 in Spain. Spain is an ideal setting for this analysis because the Great Recession affected unemployment rates in provinces across the country differently, with some regions showing strong increases in unemployment while others saw only mild changes. We distinguish between legal and illegal drugs and also between the consumption and abusive consumption of legal drugs. We estimate that when the unemployment rate of the province in which the individual lives increases by 10 percentage points, the probability of consuming alcohol in the past 12 months decreases by 3.4 percentage points. Therefore, we conclude that the consumption of alcohol is pro-cyclical, supporting the income effect hypothesis described in the theoretical literature. However, our results for tobacco abuse are quite different. We show that rising local unemployment is related to increases in the probability of smoking every day. We also find that both marihuana and cocaine use behave strongly counter-cyclically: when the local unemployment rate increases by 10 percentage points, marihuana use increases by 3 percentage points and consumption of cocaine increases by 1.2 percentage points. These counter-cyclical patterns for smoking and for marihuana and cocaine use are consistent with both the economic stress hypothesis and the substitution effect.

Finally, we also find important heterogeneity effects along several dimensions such as education, age, gender, nationality, labor market status, and type of occupation.

This is the first paper to report that drug consumption changes for both legal and illegal drugs are associated with differential effects of the Great Recession at the local level. To the best of our knowledge, this is also the first study to find that deteriorating local

[20] We have also tried to estimate the model using the unemployment rate at the regional (instead of provincial) level and the results remain practically unchanged with respect to our baseline results.

economic conditions are related to a strong increase in marihuana, cocaine, and daily cigarette use.

We believe that these findings are important not only for the potential negative implications at the individual level but also for the costs to society as a whole. For example, apart from jeopardizing the health of drug users, the consumption of drugs also poses a huge burden on non-drug users in terms of increases in the health care costs as well as higher mortality and crime rates. Thus, our findings could be of use by policy makers in the design and timely implementation of anti-drug policies that would benefit both potential drug users as well as the rest of the society.

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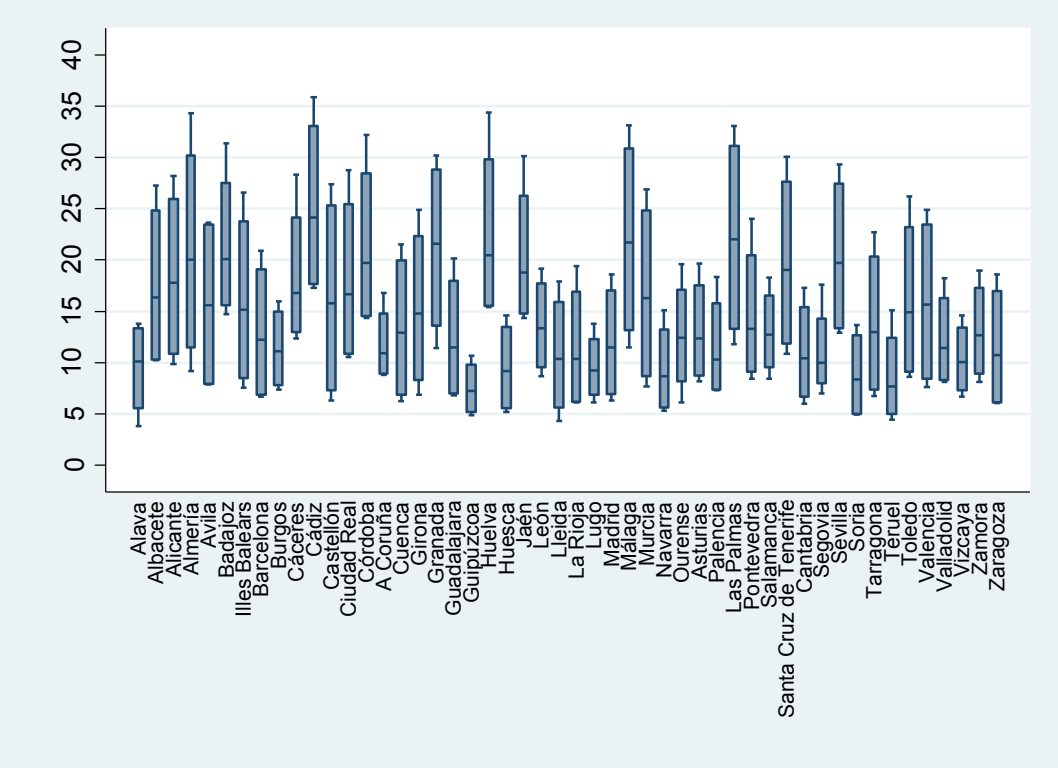
Appendix

Figure 1. Box plot graph of the unemployment rate in our sample years (2005, 2007, 2009, 2011) in Spanish provinces.



Source: Data come from the Spanish National Institute of Statistics.

Table 1. Descriptive statistics of the dependent variables. Means and standard deviations (in parentheses).

Years	2005	2007	2009	2011	Total
Alcohol in last 12 months	76,63% (42,31)	72,92% (44,43)	79,17% (40,60)	77,08% (42,03)	76,34% (42,49)
Drunk in last 12 months	22,01% (41,43)	19,60% (39,70)	27,16% (44,48)	22,44% (41,72)	22,60% (41,82)
Smoke tobacco every day during last 12 months	31,81% (46,57)	29,21% (45,47)	31,78% (46,56)	31,19% (46,32)	31,00% (46,25)
Alcohol in last 30 days	63,24% (48,21)	58,98% (49,18)	62,48% (48,41)	60,58% (48,86)	61,37% (48,68)
Alcohol every day in last 30 days	12,05% (32.56)	9,27% (29,00)	9,31% (29,06)	8,68% (28,16)	9,97% (29,96)
Marihuana in last 12 months	12,79% (33,40)	10,56% (30,74)	13,21% (33,86)	11,38% (31,76)	12,00% (32,48)
Hard drugs in last 12 months	4,03% (19,68)	3,73% (18,95)	3,99% (19,59)	3,47% (18,32)	3,81% (19,16)
Cocaine in last 12 months	3,31% (17,90)	2,96% (16,94)	3,09% (17,33)	2,81% (16,53)	3,06% (17,22)
Ecstasy in last 12 months	1,46% (12,00)	1,17% (10,78)	1,19% (10,87)	0,91% (9,52)	1,20% (10,90)
Marihuana in last 30 days	9,79% (29,72)	7,42% (26,21)	9,40% (29,19)	8,26% (27,53)	8,75% (28,25)
Hard drugs in last 30 days	2,21% (14,71)	2,00% (14,02)	1,93% (13,78)	1,46% (16,03)	1,9% (14,63)
Cocaine in last 30 days	1,76% (13,17)	1,64% (12,72)	1,43% (11,87)	1,33% (14,03)	1,54% (12,94)
Ecstasy in last 30 days	0,62% (0,78)	0,41% (0,64)	0.50% (0,70)	0.33% (0,57)	0.47% (0,68)

Table 2. Descriptive statistics of the independent variables. Means and standard deviations (in parentheses).

Years	2005	2007	2009	2011	Total
Male	50,32% (49,99)	46,84% (49,90)	50,69% (49,99)	50,73% (49,99)	49,62% (49,99)
Age	35,18 (13,85)	37,04 (13,67)	34,83 (14,01)	36,54 (12,85)	35,90 (13,64)
BornSpain	89,86% (30,18)	86,50% (34,16)	85,74% (34,96)	86,83% (33,81)	87,41% (33,16)
Good Health	85,59% (35,11)	85,22% (35,49)	86,78% (33,87)	87,23% (33,37)	86,14% (34,55)
University	19,94% (39,95)	18,54% (38,86)	14,95% (35,66)	17,67% (38,13)	17,98% (38,40)
Widowed	1,91% (13,72)	2,36% (15,20)	1,62% (12,65)	1,55% (12,37)	1,88% (13,59)
Single	47,24% (49,92)	42,89% (49,49)	50,53% (49,99)	46,22% (49,85)	46,60% (49,88)
Married	46,59% (49,88)	48,55% (49,97)	43,04% (49,51)	46,42% (49,87)	46,29% 49,86)
Divorced	4,09% (19,80)	4,82% (21,41)	4,59% (20,91)	5,59% (22,96)	4,73% (21,23)
Employed	57,94% (49,45)	57,39% (49,73)	51,90% (49,93)	52,32% (50,00)	55,18% (49,99)
Unemployed	8,77% (28,28)	8,70% (28,18)	17,53% (38,02)	21,48% (41,06)	13,62% (34,30)
Student	15,35% (36,05)	12,78% (33,38)	15,90% (36,56)	12,64% (33,23)	14,18% (34,88)
Retiree	4,53% (20,80)	5,28% (22,38)	4,36% (20,42)	4,11% (19,85)	4,58% (20,92)
House Worker	13,41% (34,07)	15,84% (36,51)	10,31% (30,41)	9,44% (29,24)	12,43% (32,98)
URProvinces	8,86% (2,83)	9,43% (3,22)	18,71% (5,16)	23,42% (6,21)	14,55% (7,63)

Note: Due to the non-homogeneity of the questions asked in the four waves of the survey, we are only able to include the following explanatory variables: “male” (which differentiates between genders), “BornSpain” (indicates whether the individual was born in Spain), “good health” (reflects the self-reported health status), “university” (identifies individuals with a completed university degree), four variables that capture the differences in civil status (“-married, single, divorced, or widowed), and, finally, five dummy variables that capture the labor market situation of the individual (employed, unemployed , student, retiree, and house worker).

Table 3. Marginal effects. Logit models for alcohol and tobacco consumption

	Alc_12M	**Drunk_12M**	**TobEveryDay**	**Alc_30Days**	**AlcEveryDay_30Days**
Male	0.0993***	0.1213***	0.0471***	0.1696***	0.1064***
	(0.005)	(0.005)	(0.004)	(0.006)	(0.004)
Age	0.0068***	0.0074***	0.0222***	0.0119***	0.0105***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age^2	-0.0001***	-0.0002***	-0.0003***	-0.0001***	-0.0001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BornSpain	0.1098***	0.0388***	0.1207***	0.1151***	0.0368***
	(0.011)	(0.007)	(0.015)	(0.014)	(0.006)
GoodHealth	0.0631***	-0.0212***	-0.0486***	0.0840***	0.0115***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.003)
University	0.0765***	0.0224***	-0.1115***	0.0842***	-0.0235***
	(0.005)	(0.005)	(0.006)	(0.006)	(0.004)
Single	0.0384***	0.1115***	0.0592***	0.0665***	-0.0114***
	(0.004)	(0.006)	(0.006)	(0.005)	(0.003)
Widow	-0.0338***	0.0547***	0.0274***	-0.0423***	-0.0152**
	(0.010)	(0.020)	(0.006))	(0.015)	0.007
Divorced	0.0154**	0.0992***	0.1388***	0.0873***	0.0071
	(0.006)	(0.007)	(0.014)	(0.007)	0.005
Student	-0.0229***	-0.0123**	-0.1478***	-0.0288***	-0.0747***
	(0.008)	(0.006)	(0.010)	(0.009)	0.007
Retiree	-0.0697***	-0.0146	0.0018	-0.0618***	-0.0035
	(0.009)	(0.012)	(0.013)	(0.010)	(0.004)
HouseWorker	-0.0915***	-0.0146***	0.0018***	-0.1200***	-0.0151***
	(0.005)	(0.012)	(0.013)	(0.010)	(0.004)
URProv.	-0.0034*	0.0030	0.0030***	-0.0019	-0.0006
	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)
Year FE	x	x	x	x	x
Province FE	x	x	x	x	x
Observ.	92,102	92,102	92,102	92,102	92,102

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Standard errors are clustered at the province level.

Table 4. Marginal effects. Ordered probit models for the number of days that the individual has consumed alcohol in the last 12 months (cut values).

	No_Alcohol	Days20_Less	Days20_29	Days30_150	MoreThan150Days
URProv.	0.0030**	0.0011**	-0.0001**	-0.0017**	-0.0023**
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Year FE	x	x	x	x	x
Province FE	x	x	x	x	x
Observ.	91,781	91,781	91,781	91,781	91,781

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The regressions include as controls gender; age; age squared; born in Spain; good health; university education; marital status dummies (single, widowed, divorced; married is the omitted category); dummies for student, retiree, or house worker; and year and province fixed effects. Standard errors are clustered at the province level.

Table 5. Count data models for the number of cigarettes smoked each day in the last 30 days and for total smoking (number of cigarettes, pipes, and cigars).

	Cigarettes_Each_Day	TotalSmoking_Each_Day
PANEL A: POISSON DISTRIBUTION		
URProv.	0.0622***	0.0637***
	(0.019)	(0.019)
PANEL B: NEGATIVE BINOMIAL DISTRIBUTION		
URProv.	0.0690***	0.0702***
	(0.020)	(0.021)
PANEL C: GAMMA DISTRIBUTION		
URProv.	0.0690***	0.0702***
	(0.020)	(0.021)
Years FE	x	x
Provinces FE	x	x
Observ.	92,102	92,102

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The regressions include as controls gender; age; age squared; born in Spain; good health; university education; marital status dummies (single, widowed, divorced; married is the omitted category),; dummies for student, retiree, and house worker; and year and province fixed effects. Standard errors are clustered at the province level.

Figure 2. Graph of the variable that captures the number of cigarettes smoked each day in the last 30 days against a Poisson distribution (with the same mean) and a negative binomial distribution (with the same mean and variance).

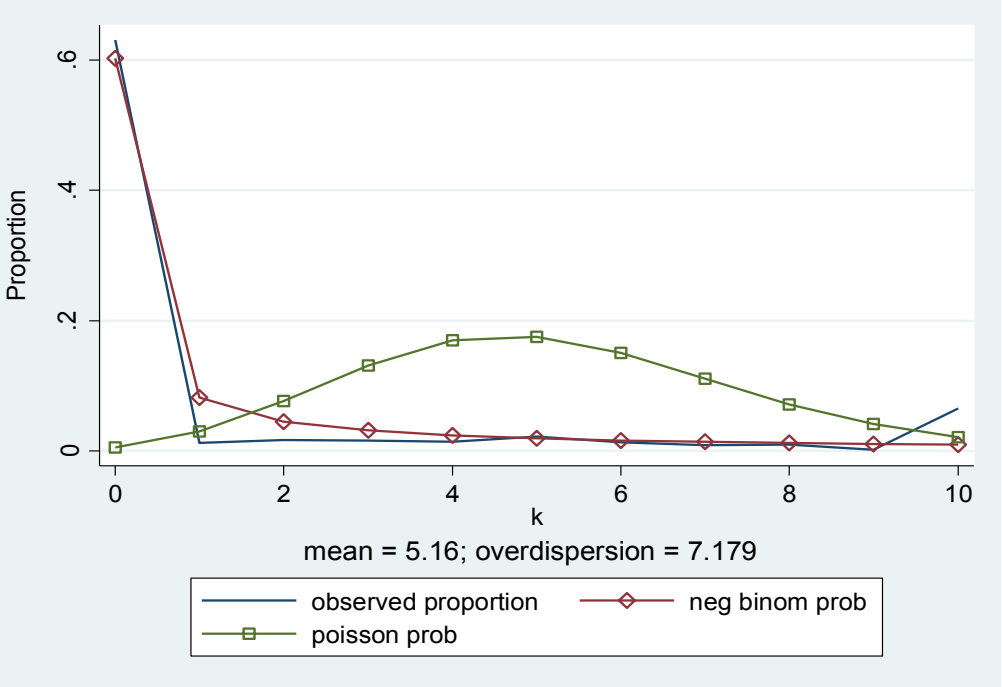


Table 6. Consumption of marihuana, hard drugs, cocaine and ecstasy in last 12 months.

	Marihuana_12M	**HardDrugs_12M**	**Cocaine_12M**	**Ecstasy_12M**
Male	0.0514***	0.0239***	0.0209***	0.0063***
	(0.003)	(0.002)	(0.002)	(0.001)
Age	0.0007	0.0023***	0.0002***	0.0003
	(0.001)	(0.000)	(0.000)	(0.000)
Age^2	-0.0001***	-0.0000***	-0.0000***	-0.0001***
	(0.000)	(0.000)	(0.000)	(0.000)
BornSpain	0.0504***	0.0210***	0.0172***	0.0077***
	(0.005)	(0.002)	(0.002)	(0.001)
GoodHealth	0.0159***	0.0076***	0.0054***	0.0028***
	(0.003)	(0.001)	(0.001)	(0.001)
University	-0.0026***	-0.0056***	-0.0053***	0.0004***
	(0.004)	(0.002)	(0.002)	(0.001)
Single	0.0700***	0.0342***	0.0282***	0.0119***
	(0.004)	(0.001)	(0.001)	(0.001)
Widowed	0.0326***	0.0148***	0.0141***	0.0005
	(0.012)	(0.006)	(0.006)	(0.004)
Divorced	0.0710***	0.0337***	0.0271***	0.0070***
	(0.007)	(0.004)	(0.004)	(0.002)
Student	-0.0229***	-0.0123**	-0.1478***	-0.0288***
	(0.008)	(0.006)	(0.010)	(0.009)
Retiree	-0.0101	-0.0036	-0.0052	0.0044*
	(0.010)	(0.006)	(0.006)	(0.003)
HouseWorker	-0.0046	-0.0017	-0.0007	0.0013
	(0.005)	(0.003)	(0.003)	(0.001)
URProv.	0.0031***	0.0009	0.0012***	-0.0004
	(0.001)	(0.001)	(0.000)	(0.000)
Year FE	x	x	x	x
Province FE	x	x	x	x
Observ.	91,742	91,913	91,913	91,879

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Standard errors are clustered at the province level.

Table 7. Consumption of marihuana, hard drugs, cocaine, and ecstasy in the last 30 days.

	Marihuana_30Days	**HardDrugs_30Days**	**Cocaine_30Days**	**Ecstasy_30Days**
URProv.	0.0024***	0.0007	0.0009*	-0.0002
	(0.001)	(0.001)	(0.001)	(0.000)
Years FE	x	x	x	x
Provinces FE	x	x	x	x
Observ.	91,868	91,913	91,884	87,474

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The regressions include as controls gender; age; age squared; born in Spain; good health; university education; marital status dummies (single, widowed, divorced; married is the omitted category); dummies for student, retiree, and house worker; and year and province fixed effects. Standard errors are clustered at the province level.

Table 8. Heterogeneous effects by education and immigrant status.

	No University	University	Immigrant	Not Immigrant
		Alcohol_12M		
URProv.	-0.0033	-0.0044**	-0.0056	-0.0030*
	(0.002)	(0.002)	(0.004)	(0.002)
Observ.	75,538	16,564	11,588	80,514
		Drunk_12M		
URProv.	0.0030	0.0028	0.0010	0.0031
	(0.002)	(0.003)	(0.003)	(0.002)
Observ.	75,538	16,564	11,588	80,514
		Tobacco_Everyday		
URProv.	0.0030***	0.0013	0.0054*	0.0029***
	(0.001)	(0.002)	(0.002)	(0.001)
Observ.	75,538	16,564	11,588	80,514
		Marihuana_12M		
URProv.	0.0027***	0.0042**	0.0014	0.0035***
	(0.001)	(0.002)	(0.002)	(0.001)
Observ.	75,704	16,038	11,447	80,235
		HardDrugs_12M		
URProv.	0.0007	0.0021*	0.0007	0.0010
	(0.001)	(0.001)	(0.001)	(0.001)
Observ.	75,843	15,687	11,066	80,376
		Cocaine_12M		
URProv.	0.0011***	0.0017*	0.0016*	0.0012**
	(0.000)	(0.002)	(0.001)	(0.001)
Observ.	75,843	15,628	10,983	80,376
		Ecstasy_12M		
URProv.	-0.0004	-0.0001	-0.0002	-0.0004
	(0.000)	(0.001)	(0.001)	(0.000)
Observ.	75,813	14,393	9,884	80,348

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The regressions include as controls gender; age; age squared; born in Spain; good health; university education; marital status dummies (single, widowed, divorced; married is the omitted category); dummies for student, retiree, and house worker; and year and province fixed effects. Standard errors are clustered at the province level.

Table 9. Heterogeneous effects by gender and age.

	Women			Men		
	15-30	**31-45**	**46-65**	**15-30**	**31-45**	**46-65**
			Alcohol_12M			
URProv.	-0.0036*	-0.0044	-0.0078**	-0.0014	-0.0030	-0.0024
	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Observ.	17,565	16,366	12,471	19,550	15,250	10,900
			Drunk_12M			
URProv.	0.0035	-0.004	-0.0002	0.0057	0.0049	-0.0007
	(0.003)	(0.002)	(0.001)	(0.004)	(0.003)	(0.002)
Observ.	17,565	16,289	12,220	19,550	15,250	10,856
			Tobacco_Everyday			
URProv.	0.0011	0.0018	0.0006	0.0058***	0.0023	0.0064***
	(0.001)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Observ.	17,565	16,366	12,471	19,544	15,250	10,900
			Marihuana_12M			
URProv.	0.0021	0.0014	0.0022	0.0035	0.0052**	0.0030**
	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Observ.	17,489	16,173	12,386	19,466	15,193	10,762
			HardDrugs_12M			
URProv.	-0.0012	0.0000	0.0003	0.0005	0.0036***	0.0027***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observ.	17,307	15,772	11,226	19,488	15,182	10,005
			Cocaine_12M			
URProv.	-0.0006	0.0007	0.0004	0.0010	0.0037***	0.0023**
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Observ.	17,307	15,387	12,429	19,405	15,182	9,935
			Ecstasy_12M			
URProv	-0.0008***	-0.0001	-0.0002	-0.0004	-0.0002	-0.0000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Observ.	17,507	16,180	12,428	19,479	15,122	10,827

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The regressions include as controls gender; age; age squared; born in Spain; good health; university education; marital status dummies (single, widowed, divorced; married is the omitted category); dummies for student, retiree, and house worker; and year and province fixed effects. Results for the consumption of ecstasy in the last 12 months do not include province fixed effects because of the low number of observations that report having consumed ecstasy. Standard errors are clustered at the province level.

Table 10. Heterogeneous effects by labor status.

	Employed	Unemployed	Student
		Alcohol_12M	
URProv.	-0.0044**	0.0003	-0.0036
	(0.002)	(0.002)	(0.003)
Observ.	48,838	12,534	13,058
		Drunk_12M	
URProv.	0.0022	0.0068**	0.0034
	(0.003)	(0.003)	(0.004)
Observ.	48,838	12,547	13,061
		Tobacco_Everyday	
URProv.	0.0010	0.0074***	0.0036*
	(0.001)	(0.003)	(0.002)
Observ.	48,838	12,547	13,061
		Marihuana_12M	
URProv.	0.0034***	0.0076***	-0.0013
	(0.001)	(0.001)	(0.002)
Observ.	47,823	12,506	13,006
		HardDrugs_12M	
URProv.	0.0015**	0.0021	-0.0010
	(0.001)	(0.001)	(0.001)
Observ.	47,907	12,529	12,876
		Cocaine_12M	
URProv.	0.0018***	0.0021*	-0.0008
	(0.001)	(0.001)	(0.001)
Observ.	47,907	12,529	12,713
		Ecstasy_12M	
URProv.	-0.0002	0.0009*	-0.0019*
	(0.000)	(0.000)	(0.001)
Observ.	48,878	12,028	12,294

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The regressions include as controls gender; age; age squared; born in Spain; good health; university education; marital status dummies (single, widowed, divorced; married is the omitted category); dummies for student, retiree, and house worker; and year and province fixed effects. Standard errors are clustered at the province level.

Table 11. Heterogeneity by blue collar/white collar.

	White	Blue
	Alcohol_12M	
URProv.	-0.0038*	-0.0048**
	(0.002)	(0.002)
Observ.	30,232	30,938
	Drunk_12M	
URProv.	0.0038	0.0016
	(0.003)	(0.002)
Observ.	30,232	30,938
	Tobacco_Everyday	
URProv.	0.0024*	0.0043*
	(0.001)	(0.002)
Observ.	30,323	30,938
	Marihuana_12M	
URProv.	0.0042***	0.0047***
	(0.001)	(0.001)
Observ.	30,139	29,737
	HardDrugs_12M	
URProv.	0.0019**	0.0013
	(0.001)	(0.001)
Observ.	29,937	29,728
	Cocaine_12M	
URProv.	0.0019**	0.0020***
	(0.001)	(0.001)
Observ.	29,937	29,728
	Ecstasy_12M	
URProv.	-0.0003	0.0001
	(0.000)	(0.000)
Observ.	28,641	28,314

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The regressions include as controls gender; age; age squared; born in Spain; good health; university education; marital status dummies (single, widowed, divorced; married is the omitted category); dummies for student, retiree, and house worker; and year and province fixed effects. Standard errors are clustered at the province level. Blue collar workers are those that perform manual labor, whereas white collar workers perform professional, managerial, or administrative work.

Table 12. Results for all outcomes with fewer covariates included in the models.

	Alc_12M	Drunk_12M	Tob_EveryDay	Marih_12M	HardDr_12M	Coca_12M	Ecst_12M
Man	0.1216***	0.1325***	0.0586***	0.0512***	0.1239***	0.0209***	0.0062***
	(0.005)	(0.005)	(0.004)	(0.003)	(0.002)	(0.002)	(0.001)
Age	0.0102***	0.0087***	0.0329***	0.0025***	0.0036***	0.0036***	0.0006
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Age2	-0.0001***	-0.0002***	-0.0004***	-0.0001***	-0.0001***	-0.0001***	-0.0000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BornSpain	0.1108***	0.0388***	0.1115***	0.0484***	0.0198***	0.0159***	0.0072***
	(0.012)	(0.008)	(0.005)	(0.002)	(0.008)	(0.002)	(0.001)
University	0.0905***	0.0251***	-0.1163***	-0.0045	-0.0068***	-0.0064***	0.0002***
	(0.005)	(0.005)	(0.006)	(0.004)	(0.002)	(0.002)	(0.001)
Single	0.0501***	0.1197***	0.0658***	0.0707***	0.0347***	0.0286***	0.0120***
	(0.004)	(0.004)	(0.007)	(0.003)	(0.001)	(0.001)	(0.001)
Widowed	-0.0364***	0.0560***	0.0402***	0.0349***	0.0165***	0.0154***	0.0017
	(0.010)	(0.020)	(0.014)	(0.012)	(0.006)	(0.006)	(0.005)
Divorced	0.0315***	0.1095***	0.1467***	0.0720***	0.0342***	0.0274***	0.0069***
	(0.006)	(0.008)	(0.009)	(0.007)	(0.004)	(0.004)	(0.002)
URProv.	-0.0032*	0.0030	0.0031***	0.0031***	0.0009	0.0012***	-0.0004
	(0.002)	(0.002)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Years FE	x	x	x	x	x	x	x
Provinces FE	x	x	x	x	x	x	x
Observ.	92,102	92,102	92,102	91,922	92,099	92,099	92,065

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Standard errors are clustered at the province level.

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