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**Article**

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## West-East Convergence in the Prevalence of Cannabis Use: Socioeconomics or Culture?

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### **Abstract:**

In contrast to West Germany, illicit drugs were virtually absent in East Germany until 1990. However, after the collapse of the former GDR, East Germany was expected to encounter a sharp increase in substance abuse. By analyzing individual data, we find that East Germany largely caught up with West Germany's ever-growing prevalence of cannabis use within a single decade. We decompose the west-east difference in prevalence rates into an explained and an unexplained part using a modified Blinder-Oaxaca procedure. This decomposition suggests that the observed convergence is only weakly related to socioeconomic characteristics and therefore remains mainly unexplained. That is, West and East Germans seem to have become more alike per se. We conclude that both parts of the country have converged in terms of the culture of cannabis consumption.

*JEL: I12, P36, P23*

*Keywords: Cannabis consumption; west-east convergence; decomposition*

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## 1 Introduction

In the former East German GDR the consumption of illicit drugs, such as cannabis, widespread in western societies was virtually absent (Reißig, 1991).<sup>1</sup> This can easily be explained by the isolation of the country from its neighbors and an extremely high level of surveillance by security forces within the country.<sup>2</sup> However, when the Berlin Wall fell in 1989 and the former GDR was subsequently integrated into the West German Federal Republic in 1990, East Germany was expected to experience a sharp increase in the prevalence of illicit drugs (Reißig, 1991) that would ultimately result in the convergence of drug consumption patterns in East and West Germany. In fact, although the prevalence of illicit drugs is still smaller in eastern Germany, in relative terms this gap had closed substantially by the year 2000.<sup>3</sup>

Gaining more insight into this process of convergence is interesting for at least two different reasons. Firstly, the case of East Germany as a country becoming suddenly exposed to the problem of illicit drug use is exceptional. Thus, it is worth examining how the prevalence of substance abuse has developed in East Germany compared to the western part of the country, which has experienced drug abuse for a much longer time. Moreover, it is worth looking at the factors that shape the process of convergence between both regions. If convergence is related to certain socioeconomic factors, one might potentially identify strategies for preventing East German prevalence rates reaching West German levels. However, if convergence – that goes along with an increase in East German drug use figures – cannot be related to such factors it might simply represent an inevitable consequence of the country’s reunification.

Secondly, in Germany the question of whether the two formerly separated parts of the country are developing a joint “cultural identity” has been intensely debated since 1990. Substance abuse might be a particularly well suited issue to address the question of genuine “cultural convergence” since, in contrast to various areas of public and private life, no political interventions took place to align drug use patterns in East Germany with those in the western part of the country. Thus, figuring out what shapes the process of convergence in prevalence rates might help to answer the question of whether both parts of the country are developing a joint “cultural identity”.

More specifically, our analysis aims at disentangling two different matters that might be reflected by convergence in prevalence rates. First, living conditions in East and West have become more equal. This applies foremost to the labor market. A large share of the East German population has already encountered unemployment and job loss by now, while employment was guaranteed to all citizens of the GDR prior to 1990. Failure and disappointment related to the individual labor market performance is found to increase the probability of drug abuse by numerous empirical studies, e.g. Pudney (2004) and Hüsler et al. (2004). In addition, western Germany

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<sup>1</sup>However, the abuse of legal psychoactive substances like analgesics and – primarily – alcohol was widespread in East Germany prior to 1990.

<sup>2</sup>Production of methamphetamine in home laboratories, which is reported for pre-1989 Czechoslovakia (Csémy et al., 2002), does not seem to have been prevalent in the former GDR.

<sup>3</sup>An increase in the consumption of illicit drugs can be observed for other post-socialist European countries for the 1990s too; cf. Lagerspetz and Moskalewicz (2002) and Csémy et al. (2002).

and eastern Germany may have converged on other socioeconomic characteristics, too, such as the average level of educational attainment, average income, and the marriage rate, which often are found to be correlated with the consumption of psychoactive substances, and finally the availability of illicit drugs.

The second possibility is that East Germans and West Germans may have simply become more similar per se, i.e. the culture of drug consumption may be what has converged since 1990. Statistically it is possible to relate the first argument to the distribution of individual socioeconomic characteristics in both regions, first and foremost to variables related to the labor market, but not the second argument. In social sciences, “cultural differences” are often implicitly defined as differences that go beyond any hard and observable socioeconomic factors – but nevertheless are obviously present.<sup>4</sup> One, therefore, may use the term “culture” as a label for what cannot be explained by socioeconomic characteristics and interpret unexplained convergence in drug consumption as a facet of cultural convergence.

In our empirical application, we decompose the west-east difference in the prevalence of cannabis use into one part that is explained by socioeconomic factors and another part that remains unexplained and, therefore, represents cultural differences in drug consumption. By repeating this decomposition for several years, we can determine to what extent the convergence in cannabis consumption is due to socioeconomic convergence on the one hand and cultural convergence on the other. For this exercise, we employ a modification to the – commonly used – decomposition technique that was originally introduced by Blinder (1973) and Oaxaca (1973). This approach is similar to the one of Burda and Schmidt (1997), who decompose wages in order to determine whether socioeconomic characteristics or unobserved human capital endowments shape the west-east wage differential and the process of wage convergence in reunified Germany.

## 2 The Data

### 2.1 Data Sources

This analysis uses data from the “Population Survey on the Consumption of Psychoactive Substances in Germany”<sup>5</sup> collected by IFT (Institute for Therapy Research) Munich; see Kraus and Augustin (2001) for a detailed description. To the

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<sup>4</sup>More specifically, “cultural differences” are often characterized as “the dustbin of social science”, since one may easily attribute any observed (regional) difference to cultural differences if no explanation is available based on observable socioeconomic or institutional factors. Yet, such an “explanation” is unlikely to provide any further insight. One may certainly disagree with this implicit “definition” that uses the term “culture” as a label for something unexplained. However, no unambiguous and generally accepted definition seems to be available. Rather, various different definitions of the term “culture” can be found. A classical one is by Tylor (1903): “Culture or civilization, taken in its wide ethnographic sense, is that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society.”

<sup>5</sup>“Bundesstudie Repräsentativerhebung zum Gebrauch psychoaktiver Substanzen in Deutschland”. The data is provided through “Central Archive for Empirical Social Research, University Cologne”; <http://www.gesis.org/en/za>.

author's knowledge, this data represents the most comprehensive source of information on substance abuse among adults in Germany. The Population Survey on the Consumption of Psychoactive Substances in Germany is not a panel but consists of eight separate cross-sections at the level of individual consumers. The surveys were carried out by mail at irregular intervals in the years 1980, 1986, 1990, 1992, 1995, 1997, 2000 and 2003. The sample size varies significantly from 4 455 in 1992 to 21 632 in 1990. The data comprises comprehensive information with respect to the consumption of various legal as well as illicit drugs. Additionally, some information on socioeconomic characteristics and sampling weights are provided along with attitudes towards several drug-related issues.

The most recent survey is not yet available for public scientific use. The surveys prior to 1990 concentrate solely on West Germany, while the one carried out in 1992 exclusively deals with the former GDR. Therefore, our analysis only considers the surveys carried out in 1990, 1995, 1997, and 2000 that are both available to us and cover both parts of the country. We do not consider individuals that do not have German citizenship, since foreigners are not included in the 1990 survey. We must also exclude individuals living in Berlin, since some of the surveys do not distinguish the eastern part of the city from its western part. The design of the survey has substantially changed over time. One of these changes concerns the age groups that were interviewed. While teens and young adults aged 12 to 39 years were interviewed in 1990, the surveys after 1992 focussed on adults aged 18 to 59. In order to analyze an age group that is consistent across waves, we only consider respondents aged 18 to 39. To check for the sensitivity of our results to the rule for selecting the sample, we also try an alternative approach. That is, instead of focussing on a specific age group we consider a certain age pseudo-cohort, more specifically we include those individuals that were born in the years from 1951 to 1972; see Appendix B.2 for the corresponding results. That is, the selected sample remains unchanged for the year 1990. Yet, for the subsequent waves the selected samples – on average – consist of older individuals.

Unfortunately, not only was the target population substantially modified, but so were the questionnaires. In particular, the number of questions was considerably reduced in 1995, eliminating almost all concerned with the respondents' family background. Moreover, several questions were substantially rephrased. Therefore, it is not possible to ensure consistency across waves for any variable. However, consistent information on drug use participation and the frequency of consumption is available. Nonetheless, the reliability of self-reported data on substance use is always a matter of concern. Underreporting of consumption levels and drug use participation appears to be a likely and obvious behavior, as substance abuse is socially disapproved and may even represent a criminal offense. Several studies have investigated the nature of misreporting and in particular the role survey conditions play for this problem, e.g. Mensch and Kandel (1988) and Hoyt and Chaloupka (1994). Self-administered surveys – as the ones at hand – seem to be less vulnerable to underreporting bias than telephone or face-to-face interviews. Yet, surveys that have a special focus on drug related questions seem to yield lower reported prevalence rates and lower consumption levels compared to surveys with a general scope. In order to validate survey results, more recently, analytical chemists have tried to

Table 1: Mean Twelve-Month Prevalence of Cannabis Consumption

year	West			East		
	Mean	Std. Error	# of obs.	Mean	Std. Error	# of obs.
1990	0.047	0.002	14 976	0.006	0.002	1 882
1995	0.087	0.006	3 235	0.031	0.010	617
1997	0.077	0.007	3 443	0.032	0.011	829
2000	0.103	0.006	3 298	0.072	0.011	677

**Note:** Weighted by inverse sampling probability.

calculate drug consumption figures from the concentrations of certain drug residues found in sewage water, cf. Becker (2005) and Zuccato et al. (2008). For the cases of Milan, London, and Lugano Zuccato et al. (2008) conclude that by and large these figures are in line with survey based official statistics. Yet, for some German cities the concentration of benzoylecgonin – a cocaine degradation product – seems to indicate much higher consumption levels of cocaine than suggested by survey results (Becker, 2005). Thus, underreporting might be an issue in our data. Yet, it seems to be hard to precisely pin down the importance of the bias that originates from underreporting. Moreover, since our analysis has its focus on comparing drug use in West and East Germany, underreporting represents a minor problem as long as reporting behavior does not systematically vary across both regions.

## 2.2 Consumption of Illicit Drugs

The data considers various illicit drugs. These are cannabis, speed and other amphetamines, LSD, mescaline, heroin, methadone, polamidone, codeine, opium and cocaine. The more recent waves also consider crack-cocaine, ecstasy, and “magic mushrooms”. In addition, the questionnaires address substances that are not explicitly mentioned through the use of open questions. Our empirical analysis focusses on the consumption of cannabis. Cannabis represents, by far, the most prevalent illicit drug. Compared to this drug, the prevalence rate for any other substance mentioned above is quite low, i.e. only a small number of individuals report having consumed illicit drugs other than cannabis. Thus, sufficient data for carrying out a detailed decomposition analysis is available only for cannabis consumption. In fact, the prevalence rates for cannabis use and for illicit drug use in general almost perfectly coincide. That is, for only a minuscule number of drug users, cannabis does not belong to the list of consumed substances.

For cannabis, as well as any other substance, the data comprises several measures of consumption, such as the age at the time of first use, lifetime prevalence, twelve-month prevalence, one-month prevalence, lifetime frequency of use, as well as twelve- and one-month frequency of use. For this analysis, we consider the twelve-month prevalence as the most appropriate measure. In particular, we prefer this measure to the lifetime and one-month prevalence for the following reasons. On the one hand, the lifetime prevalence does not seem to be an appropriate basis for comparing the current consumption of illicit drugs in West and East Germany. By this measure, even those individuals that might have smoked a single joint 20 years

Table 2: **Unconditional West-East Differences in Cannabis Prevalence**

year	difference in means		ratio of means		difference in log-means	
	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
1990	0.041	0.003	7.771	2.483	2.050	0.320
1995	0.055	0.011	2.761	0.860	1.016	0.311
1997	0.045	0.013	2.404	0.877	0.877	0.365
2000	0.031	0.012	1.422	0.231	0.352	0.162

**Note:** Weighted by inverse sampling probability.

ago are classified as drug consumers. Moreover, since it was hardly possible to have experience with illicit drugs in the former GDR, using the lifetime prevalence is likely to bias any west-east comparison. On the other hand, the one-month prevalence misses many drug users that consume illicit drugs on an irregular basis, which seems to be the case for the majority of consumers in the sample.

We now examine the ordinary empirical twelve-month prevalence of cannabis consumption stratified by region and year. It is quite clear that the prevalence of cannabis use rose in eastern Germany during the 1990s; see Table 1. In 1990, i.e. immediately after the collapse of the communist system in the former GDR, less than one percent of the East German population aged 18 to 39 years had consumed cannabis. By the mid 1990s, this number rose to more than three percent. Finally, in 2000, more than seven percent of East Germans stated having used marihuana or hashish in the last twelve months prior to taking the survey. Yet, somewhat surprisingly, a similar increase in cannabis abuse had also taken place in western Germany; see Table 1. While the twelve-month prevalence was lower than five percent in 1990, it reached almost nine percent by the mid 1990s and exceeded ten percent by the year 2000. In fact, the west-east gap in cannabis use seems to be rather stable during the 1990s and appears to be most distinct by the middle of the decade rather than at its beginning; see Table 2. In fact, none of the observed changes in the level of west-east difference is statistically significant. Correspondingly, Augustin and Kraus (2001) conclude that the prevalence of substance abuse – if at all – has only marginally converged.

If, however, ratios of prevalence rates are compared instead of differences, this impression no longer holds. In contrast to Augustin and Kraus (2001), Perkonigg et al. (1998) argue that – in relative terms – the increase in prevalence rates is much more pronounced in East Germany than in West Germany. According to our data in 1990 West Germans were almost eight times more likely than East Germans to have consumed cannabis during the twelve months prior to taking the survey. This figure drops to the range between two and three in 1995 and 1997. In 2000 West Germans were just 1.4 times more likely to take hashish or marihuana than their East German counterparts; see Table 2. Moreover, the gap in the prevalence of cannabis use has closed in a statistically significant way in terms of ratios. Taking the logs of ratios leads to differences in log-prevalence rates; see Table 2. As a monotonic transformation, changes in log-means mirror the changes in ratios. We base our further analysis on differences in log-prevalence rates. We believe that focussing on differences in absolute prevalence rates overlooks the distinct process

Table 3: **Twelve-Months Frequency of Cannabis Use (shares)**

year	region	once	2-5 times	6-9 times	10-19 times	20-59 times	>59 times
1990	West	0.222	0.347	0.103	0.089	0.104	0.137
	East	0.459	0.416	0.000	0.067	0.059	0.000
1995	West	0.115	0.183	0.145	0.138	0.210	0.208
	East	0.213	0.333	0.070	0.135	0.173	0.076
1997	West	0.172	0.231	0.075	0.152	0.141	0.230
	East	0.261	0.461	0.020	0.058	0.026	0.174
2000	West	0.147	0.325	0.081	0.118	0.127	0.203
	East	0.261	0.198	0.079	0.127	0.133	0.202

**Notes:** Weighted by inverse sampling probability. Shares among cannabis consumers.

of convergence that is revealed through considering ratios of prevalence rates.

As an alternative approach, we base the analysis on the twelve-months frequency of use rather than twelve-months prevalence. Thus, this alternative approach does not only use the information on hash- and marijuana-smoking participation but also information on the intensity of consumption.<sup>6</sup> In our data, the frequency of consumption is interval-coded. The different questionnaires (cf. Appendix A) allow for the construction of seven cross-wave-consistent categories of cannabis use during the last twelve months; in detail (i) no consumption, (ii) consumed once, (iii) two to five times, (iv) six to nine times, (v) ten to 19 times, (vi) 20 to 59 times, and (vii) 60 times and more. Table 3 displays the distribution of these categories among actual cannabis users for both regions and the four considered years. To some degree west-east convergence may be seen in the frequency of use too. For instance, in 1990 the share of non-occasional users (more than than 5 times a year) is more than three times larger in West Germany than in the eastern part of the country. By the year 2000 any West-East deviation in this share has virtually disappeared. In particular the share of notorious consumers (more than 59 times a year), which in 1990 were completely absent from the East German sample, seems to have converged. Yet, due to the rather small number of cannabis consumers in the East German subsample, these findings are less reliable from a statistical point of view than the corresponding results for the prevalence rates.

### 2.3 Socioeconomic Characteristics

The data comprises information about several individual socioeconomic characteristics that may be related to the consumption of illicit drugs. In particular, these variables are: gender, age, number of biological children, months of unemployment during the last five years prior to taking the survey, marital status, living arrangements, current educational arrangements, labor market status, highest educational attainment, type of current or most recent job, income measured as income strata, and, finally, city/town population.

<sup>6</sup>See Appendix B.2 for the corresponding estimation results.



Table 4: Months Unemployed during the Previous Five Years

year	West		East	
	Mean	Std. Error	Mean	Std. Error
1990	1.533	0.052	0.273	0.036
1995	1.602	0.110	5.523	0.444
1997	1.716	0.145	5.844	0.591
2000	1.492	0.094	4.878	0.420

**Note:** Weighted by inverse sampling probability.

A precondition for relating any west-east convergence in drug consumption to the labor market performance of individuals is that some variables related to the labor market display different trends in both parts of the country. We, therefore, have a closer look at the answer to the question “How many months have you been registered as unemployed in the last five years?”; see Table 4. While the average time spent in unemployment in West Germany remained rather stable in the 1990s, this figure increased dramatically in East Germany. At the beginning of the decade, East German respondents had experienced unemployment to a much lower extent than those from the western part of the country. Yet, this pattern has already reversed by the middle of the decade. In 1995, East Germans had experienced 3.5 times as many months in unemployment on average than West Germans did. This figure remained stable until the year 2000. Given that disappointment related to the individual labor market performance is, in fact, closely related to the consumption of illicit drugs, the convergence of this prevalence may be explained to some extent by the sharp increase in unemployment in East Germany during the early 1990s. In addition to this retrospective variable, we look at the current labor-market status. In 1990, the share of employed individuals in the sample was 13% higher for eastern Germany than for the western part of the country. Yet, this gap in employment rates had entirely closed by the year 2000. The share of currently registered unemployed is three times higher among East Germans than among West Germans in the 1990 sample. By the year 2000, this ratio had even reached the value of four. This gives additional support for the hypothesis that changes in relative prevalence rates might be correlated with changes in relative labor-market conditions.

The analysis would certainly benefit from controlling for the supply side at the local market for illicit drugs and – closely related – local drug prices.<sup>7</sup> In the survey data used, the only available variable that captures the supply of illicit substances is the answer to the questions “How easily can you acquire cannabis, speed, LSD, etc. within 24 hours?”. However, only drug users typically know how to acquire drugs in the short term, while non-users typically do not. For this reason, this variable is a rather imprecise and subjective measure for the actual supply of illicit drugs and fails to capture supply independently from demand.<sup>8</sup> We, therefore, do not include this variable in the list of right-hand-side variables.

<sup>7</sup>The empirical evidence on the effects of drug prices on drug consumption is mixed, cf. van Ours and Williams (2007), DeSimone and Farrelly (2003), and Saffer and Chaloupka (1999).

<sup>8</sup>In fact, a dummy variable indicating that an individual regards acquiring illicit drugs within 24 hours as feasible, perfectly predicts the prevalence of illicit drugs for several relevant subsamples.

As an alternative approach, we consider official criminal statistics on cannabis seizures as a rough measure for regional cannabis supply.<sup>9</sup> This data is available at the level of Federal States (Bundesländer). Yet, this approach exhibits certain limitations too. First, for the year 1990 statistics on drug seizures do not exist for the majority of East German States. Second, cannabis seizures do not necessarily mirror the local drug supply. Large quantities of illicit substances are confiscated in transit – e.g. Hamburg frequently reports exceptionally large seizures because of major (illegal) drug turnover at the city’s harbor – which are not meant for sale at the local drug market. Finally, figures on cannabis seizures still reflect both supply and demand for illicit drugs. Being aware of these shortcomings, as a robustness check we report results for a model variant that includes regional cannabis seizures per head and year at the right-hand-side; see Appendix B.3. Yet, we do not consider this specification as our preferred model.

### 3 The Analytical Framework

#### 3.1 The Decomposition Rule

In order to answer the question of whether west-east convergence in the consumption of cannabis is associated with socioeconomic characteristics or represents an unexplained cultural phenomenon, we use a modified Blinder (1973) and Oaxaca(1973) decomposition technique. This technique allows the fractionalization of differences in conditional means into one part that can be explained by socioeconomic characteristics and another that originates from deviations in the model parameters. The second part, therefore, is unexplained and represents a cultural gap in the sense discussed above. The Blinder (1973) and Oaxaca (1973) decomposition is based on separate estimates of the conditional mean of a dependent variable  $y$  for two distinct subpopulations. In our application, the dependent variable of interest is the dummy indicating that a respondent has consumed cannabis during the twelve months prior to taking the survey. The subpopulations are West Germans and East Germans.

If the decomposition rule is generalized to non-linear models, cf. Fairlie (1999 and 2003) and Bauer and Sinning (2008), it can be written:

$$\Delta_t = \Delta_t^{expl} + \Delta_t^{unex} \quad (1)$$

with

$$\begin{aligned} \Delta_t &\equiv E_x [E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{west}, t] - E_x [E(y_{it}|x_{it}, \beta_t^{east})|i \in I^{east}, t] \\ \Delta_t^{expl} &\equiv E_x [E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{west}, t] - E_x [E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{east}, t] \\ \Delta_t^{unex} &\equiv E_x [E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{east}, t] - E_x [E(y_{it}|x_{it}, \beta_t^{east})|i \in I^{east}, t] \end{aligned}$$

Here, the index  $i$  indicates individuals, while  $t$  indicates periods.  $I^{west}$  denotes the

<sup>9</sup>This data was provided by Germany’s Federal Criminal Police Office (Bundeskriminalamt, BKA) and the State Criminal Police Offices (Landeskriminalämter, LKA) of Baden-Württemberg, Bayern, Hessen, Nordrhein-Westfalen, Rheinland-Pfalz, Saarland, Sachsen, Sachsen-Anhalt, Schleswig-Holstein, and Thüringen.

set of individuals living in West Germany, and  $I^{east}$  the corresponding set for East Germany. The vector  $x_{it}$  consists of individual socioeconomic characteristics and  $\beta$  represents a vector of parameters.  $\Delta_t^{expl}$  captures the component of differences in conditional means that is explained by socioeconomic characteristics. In other words, by  $\Delta_t^{expl}$  we measure the counterfactual difference in expected prevalence rates that would arise if in East Germany the right-hand-side variables had the same joint pattern of association with cannabis consumption as they actually do have in West Germany.<sup>10</sup>  $\Delta_t^{unex}$  captures the component in conditional means that is not explained by socioeconomic characteristics and, therefore, captures cultural differences between both parts of the country. I.e. by  $\Delta_t^{unex}$  we estimate the counterfactual difference in expected prevalence rates that would still arise even if in West Germany the explanatory variables had the same distribution as they actually do have in East Germany.<sup>11</sup>

The conditional mean  $E(y_{it}|x_{it}, \beta_t^{west})$  is estimated as the normal cdf  $\Phi(x'_{it}\hat{\beta}_t^{west})$ , whereas the coefficients' estimate  $\hat{\beta}_t^{west}$  is obtained from a probit<sup>12</sup> regression using the relevant subsample. Analogously, this applies to  $E(y_{it}|x_{it}, \beta_t^{east})$ . Estimates for the expectations unconditional on  $x$ , i.e.  $E_x[E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{west}, t]$ , are derived through taking weighted sample means of  $\Phi(x'_{it}\hat{\beta}_t^{west})$ , once again using the relevant subsample. This analogously applies to  $E_x[E(y_{it}|x_{it}, \beta_t^{east})|i \in I^{east}, t]$  as well as  $E_x[E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{east}, t]$  and  $E_x[E(y_{it}|x_{it}, \beta_t^{east})|i \in I^{west}, t]$ , whereas counterfactual probabilities are used for calculating the latter ones. That is, we use estimates  $\hat{\beta}$  that are obtained from the antithetic subsample to the one that is used for calculating the sample mean.

For the variant of the model that uses information on the twelve-month frequency of cannabis consumption rather than a simple binary indicator we use interval regression, i.e. an ordered probit model with known interval boundaries (Cameron and Trivedi, 2005), for estimating the coefficients  $\beta$ . From these estimates, we still calculate conditional probabilities for any use of cannabis during the last twelve months, i.e.  $\Phi(x'_{it}\frac{\hat{\beta}_t}{\hat{\sigma}_t})$ , and subsequently carry out a decomposition analysis in exactly the same way as described above.<sup>13</sup>

As pointed out in Section 2.2, we consider ratios of prevalence rates rather than differences. For this reason, we do not decompose raw differences in conditional expectations but consider differences in log-expectations. Therefore we redefine  $\Delta_t$ ,

<sup>10</sup>Obviously, one may define  $\Delta_t^{expl}$  the other way round as the difference that would arise if in West Germany the explanatory variables had the same pattern of association with drug consumption as they actually have in East Germany. The results will not remain unaffected by this arbitrary choice (Oaxaca, 1973).

<sup>11</sup>Once again, one may define  $\Delta_t^{unex}$  differently and interchange east and west. This arbitrary choice will lead to different results. We therefore report results for either variant.

<sup>12</sup>Decomposition results just marginally change if a logit or a complementary log-log model is used instead.

<sup>13</sup>One may think of using information on the frequency of cannabis consumption not only for estimating the regression model but also for the subsequent decomposition analysis. Technically this is straightforward (Bauer and Sinning, 2008). However, the economic interpretation of such decomposition results remains vague, since the ordered probit model does not generate a scalar conditional mean in terms of the observed – as opposed to the latent – dependent variable.

$\Delta_t^{expl}$ , and  $\Delta_t^{unex}$ :

$$\begin{aligned}\Delta_t &\equiv \log E_x [E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{west}, t] - \log E_x [E(y_{it}|x_{it}, \beta_t^{east})|i \in I^{east}, t] \\ \Delta_t^{expl} &\equiv \log E_x [E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{west}, t] - \log E_x [E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{east}, t] \\ \Delta_t^{unex} &\equiv \log E_x [E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{east}, t] - \log E_x [E(y_{it}|x_{it}, \beta_t^{east})|i \in I^{east}, t]\end{aligned}$$

Equation (1) still applies. Ultimately, our focus is on the changes in the unexplained part ( $\Delta_t^{unex} - \Delta_{t-1}^{unex}$ ). If these changes prove to be negative and significant, one can conclude that the cultural gap in drug consumption has in fact diminished during the 1990s, and that both parts of the country have in fact become culturally more akin.

In order to judge changes in  $\Delta_t^{unex}$  as statistically significant, standard errors are required. Unfortunately, standard errors are rarely reported for the Blinder-Oaxaca decomposition (Jann, 2005). Jann (2005) derives analytical standard errors for the basic linear case. Yet, these are not applicable in our case, since we apply a generalized non-linear decomposition rule. This is why we report bootstrapped standard errors rather than analytical ones. In the bootstrap sampling weights are accounted for by duplicating each observation as many times as indicated by its weight and subsequently drawing from the expanded sample.<sup>14</sup>

### 3.2 The Regression Model

As a starting point, we estimate a pooled probit model using all valid observations. We include all available variables that may serve as explanatory ones, i.e. age, age squared, number of biological children, number of months of unemployment, gender and marital status, as well as groups of indicators indicating (i) living arrangements, (ii) current education arrangements, (iii) labor market status, (iv) highest educational attainment, (v) type of current or most recent job, (vi) income measured as income strata, (vii) city/town population. In addition, a dummy indicating living in East Germany and time-dummies are included. Any of these variables or groups of variables are statistically significant.

It is important to emphasize, that a significant relationship must not be interpreted in terms of causality. For many variables, for instance being unemployed and being single, the direction of causality is far from obvious: On the one hand, one may argue that being frustrated with both career and private life leads to the abuse of psychoactive substances. On the other hand, individuals who have problems with illicit drugs are less likely to find either a job or a spouse. We, therefore, interpret any relation of left-hand-side and right-hand-side variables in terms of correlation rather than causality. Correspondingly, coefficient estimates must not be interpreted as marginal effects. But still, decomposing differences in prevalence rates into one component that is associated with differences in socioeconomic characteristics and another that is not associated with them is meaningful, even if this association does not represent causality.

<sup>14</sup>Duplication factors need to be integers, yet sampling weights take non-integer values. This results in a small rounding error.

Since the pooled model does not argue in favor of any exclusion restrictions, the straightforward approach is to estimate the full model separately for all eight subsamples defined by region and period of time. Yet, because of the relatively small sample size for East Germany and its relatively low prevalence rate, the full model cannot be estimated using only the East German subsamples; cf. Table 1. Two different approaches may be followed in order to impose more structure on the data and to circumvent this problem. In the first approach, the size of the model is reduced until it is estimable for all eight subsamples. In the second, the full model is not estimated separately for all eight cells, but subsamples are pooled either across time or across region. Yet, pooling comes with cost. If pooling is across time, i.e. two regressions are run (one for each region), changes in culture are captured only by time-dummies. That is, the association of cannabis prevalence with the right-hand-side variables is assumed to be constant over time. This certainly limits any analysis that targets cultural change. If pooling is across regions instead, i.e. four regressions are run (one for each period), cultural differences between both parts of the country are exclusively captured by the differences in constants ( $\alpha_t^{west} - \alpha_t^{east}$ ).<sup>15</sup> In fact, in the linear – but not the non-linear – case the unexplained component  $\Delta_t^{unex}$  simply reduces to  $(\alpha_t^{west} - \alpha_t^{east})$ . This means that, in the case of regional pooling, the decomposition is only a tool that helps to interpret estimated regional constants  $\hat{\alpha}$  and their changes over time. Yet, even if a Blinder-Oaxaca decomposition that is based on a pooled regression appears as a degenerated decomposition-exercise, it is still beneficial in interpreting the estimation results.<sup>16</sup>

Following the first approach leads to a regression model with only five right-hand-side variables, three dummies indicating gender, employment status and living in a city along with age and the number of months of unemployment in the five years prior to taking the survey. For the West German subsamples, all these variables are highly significant for any year. In contrast, only age turns out to be a significant predictor in the probit regression using the East German subsamples. All other variables – if at all – are only occasionally significant in one out of four years; some of them even show reversing signs in different periods. Therefore, although it is technically feasible to base a decomposition-exercise on these regressions, the decomposition results critically rely on estimates  $\hat{\beta}_t^{east}$  that apparently do not contain any information that is statistically firm. The finding that the decomposition results are extremely sensitive to changing the region of reference corroborates the scepticism about this approach. Running separate regressions for all eight cells, therefore, does not appear to be a promising strategy, and pooling might be the preferable approach. However, pooling across periods does not substantially improve matters. In a probit regression that uses a pooled East German subsample and the full set of right-

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<sup>15</sup>Technically, this difference is estimated as a single coefficient attached to one regional dummy variable.

<sup>16</sup>As a compromise of (i) a pooled regression with just a regional-dummy and (ii) two separate ones for both regions, i.e. a regression that contains a full set of interaction terms with the regional indicator, one may think of using a selected set of interaction terms. Alternatively, one may impose even more restrictions on the model by combining regional pooling with pooling across periods; i.e. a specific constant term  $\alpha$  is estimated for any of the eight subsamples defined by region and time, yet all other coefficients from the vectors  $\beta$  are not allowed to vary neither across regions nor across periods.

Table 5: Probit Regression Pooled by Region

	Year 1990		Year 1995		Year 1997		Year 2000	
	Coeff.	Std. E.	Coeff.	Std. E.	Coeff.	Std. E.	Coeff.	Std. E.
east	-0.788**	0.173	-0.569**	0.156	-0.521**	0.188	-0.354**	0.113
female	-0.272**	0.050	-0.507**	0.100	-0.286**	0.105	-0.319**	0.074
age	0.028	0.061	0.058	0.091	0.165 *	0.100	-0.167**	0.068
age <sup>2</sup> /100	-0.123	0.113	-0.179	0.158	-0.302*	0.165	0.232 **	0.117
married	-0.442**	0.098	-0.602**	0.130	-0.498**	0.190	-0.348**	0.131
living with partner	-0.105	0.091	0.099	0.126	-0.224	0.150	-0.075	0.122
living with parents	-0.156	0.096	0.101	0.137	-0.036	0.149	-0.206	0.129
living with somebody else	0.093	0.092	0.366**	0.123	0.004	0.164	0.036	0.116
number of children	-0.070	0.060	-0.122*	0.063	-0.027	0.094	-0.107	0.066
pupil	0.205*	0.117	0.448	0.273	0.454*	0.268	0.457**	0.153
student	-0.079	0.097	0.065	0.201	0.479**	0.212	0.264*	0.138
apprentice	0.001	0.081	0.110	0.217	0.396**	0.201	0.250*	0.149
employed full-time	-0.036	0.081	-0.107	0.172	0.127	0.161	-0.121	0.124
employed part-time	0.172	0.113	0.258	0.229	0.084	0.196	-0.018	0.159
employed marginally	0.172	0.120	0.106	0.271	0.009	0.200	0.380**	0.125
jobless	0.411**	0.127	0.083	0.228	0.579**	0.216	0.098	0.182
number of months unemployed	0.021**	0.004	0.021**	0.006	0.004	0.007	0.022**	0.005
blue collar	0.069	0.077	0.404**	0.155	0.241	0.195	0.239**	0.117
white collar	-0.100	0.083	0.256	0.158	0.162	0.174	0.110	0.115
self-employed	0.273**	0.129	0.780**	0.188	0.586**	0.213	0.241	0.165
low degree of schooling	-0.074	0.178	0.117	0.195	-0.665**	0.232	-0.037	0.223
intermediate degree of schooling	-0.008	0.180	0.252	0.193	-0.267	0.222	0.145	0.201
high degree of schooling	0.116	0.185	0.194	0.212	-0.148	0.234	0.244	0.207
university degree	-0.135	0.213	0.369	0.231	-0.329	0.245	0.166	0.226
income 1000 DM to 1500 DM	-0.106	0.121	0.221	0.170	-0.048	0.203	-0.005	0.145
income 1500 DM to 2000 DM	0.099	0.118	-0.107	0.179	-0.281	0.225	0.207	0.161
income 2000 DM to 2500 DM	-0.087	0.120	-0.367**	0.179	-0.307	0.199	0.117	0.156
income 2500 DM to 3000 DM	0.008	0.122	-0.457**	0.192	-0.344	0.212	0.134	0.158
income 3000 DM to 4000 DM	-0.072	0.120	-0.260	0.179	-0.274	0.201	-0.026	0.149
income 4000 DM to 5000 DM	-0.156	0.125	-0.082	0.181	-0.339	0.210	0.014	0.163
income 5000 DM to 6000 DM	0.035	0.133	0.041	0.209	-0.451*	0.257	0.210	0.164
income more than 6000 DM	0.176	0.124	-0.322	0.209	-0.202	0.234	-0.056	0.156
city/town pop. 2 to 5 thousand	-0.074	0.107	0.007	0.308	0.544*	0.296	0.570**	0.200
city/town pop. 5 to 20 thousand	0.034	0.092	0.225	0.253	0.487*	0.261	0.504**	0.185
city/town pop. 20 to 50 thousand	0.051	0.097	0.149	0.264	0.679**	0.273	0.402**	0.183
city/town pop. 50 to 100 thousand	0.199*	0.106	0.413	0.267	0.414	0.292	0.707**	0.260
city/town pop. 100 to 500 thousand	0.126	0.098	0.486*	0.249	0.613**	0.273	0.489**	0.195
city/town pop. more than 500 thousand	0.305**	0.098	0.731**	0.248	0.770**	0.273	0.577**	0.180
constant	-1.316	0.818	-2.027	1.346	-3.725**	1.547	0.905	0.983
number of observations	13 400		3 584		3 682		3 318	
log-likelihood	-1 999.4		-734.1		-745.3		-860.0	
joint significance (P-value)	0.000		0.000		0.000		0.000	

**Notes:** Regressions are weighted by inverse sampling probabilities.

\*\* and \* indicate significance at the 0.05- and the 0.1-level.

hand-side variables, estimated standard errors are still very large. This may be explained by the small number of cannabis consumers observed in East Germany. Therefore, pooling over periods still presents the problem that any decomposition result critically depends on estimates  $\hat{\beta}^{east}$  that are barely reliable.

In order to capture the unexplained part of west-east deviations in the prevalence of cannabis abuse using a measure that is more reliably estimated than  $(\hat{\beta}_t^{west} - \hat{\beta}_t^{east})$ , we prefer to pool across regions, although the resulting decomposition represents a somehow degenerated Blinder-Oaxaca approach. In fact, the indicator for East Germany is always highly significant; see Table 5. Moreover, almost all regressors or groups of regressors, respectively, are clearly significant in at least two out of four regressions. Imposing more structure on the data via west-east pooling, therefore, seems to improve the reliability of estimates, though it implies the restrictive assumption that cultural differences are entirely due to differences in conditional con-

Table 6: West-East Decomposition of the Prevalence of Cannabis Use

Year	$\Delta_t$	$\Delta_t^{expl}$	$\Delta_t^{unex}$	$\Delta_t^{expl}$	$\Delta_t^{unex}$
		Ref. Region West	Ref. Region East		
1990	1.922** (0.303)	0.199* (0.111)	1.723** (0.323)	0.254* (0.147)	1.668** (0.327)
1995	0.984** (0.226)	0.119 (0.100)	0.865** (0.218)	0.144 (0.125)	0.840** (0.216)
1997	1.234** (0.230)	0.249** (0.099)	0.986** (0.245)	0.329** (0.115)	0.906** (0.228)
2000	0.406** (0.152)	-0.138* (0.074)	0.545** (0.164)	-0.142 (0.087)	0.548** (0.170)
joint significance <sup>†</sup>	0.000	0.006	0.000	0.004	0.000

**Notes:** Bootstrapped standard errors in parentheses. <sup>†</sup>P-values reported for joint tests. \*\* and \* indicate significance at the 0.05- and the 0.1-level.

sumption levels and cannot be related to regionally differing patterns of association of cannabis consumption with socioeconomic characteristics.<sup>17</sup>

## 4 Decomposition Results

### 4.1 Results for the Basic Model Specification

In this section, we present decomposition results that are based on the preferred specification<sup>18</sup>, for which estimation results are reported in the previous section; see Table 5. Table 6 displays estimates for the mean difference in log-conditional means  $\Delta_t$  as well as its components  $\Delta_t^{expl}$  and  $\Delta_t^{unex}$ . For the latter two variants are displayed, one with West Germany serving as reference category, i.e.  $\log E_x [E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{east}, t]$  is used as counterfactual log-mean, and another variant where the reference region is reversed, i.e.  $\log E_x [E(y_{it}|x_{it}, \beta_t^{east})|i \in I^{west}, t]$  enters the decomposition-formula. Both variants do just marginally differ. This does not come as a surprise. Due to pooling across regions,  $\Delta_t^{unex}$  rests on the deviation of constants  $\alpha_t^{west}$  and  $\alpha_t^{east}$  alone. Therefore, in the case of a linear model, both variants of the decomposition coincide. In the case considered here, the deviation of both variants is solely due to non-linearity, i.e. calculating normal probabilities and taking logarithms.

West-east differences in log-mean conditional prevalence rates are significant individually for any year as well as jointly. In any year, the unexplained component exceeds the explained one by far in absolute terms. This result is statistically con-

<sup>17</sup>All three variants of the model, i.e. (i) separate regressions for all eight subsamples using a small set of regressors, (ii) pooling across periods using the full set of regressors, and (iii) pooling across regions using the full set of regressors, impose certain restrictions on the general model that neither pools subsamples nor excludes right-hand-side variables. Yet, since the general model is not identified, it is not possible to test which one of the restricted specifications is preferable.

<sup>18</sup>That is (i) pooling across regions, (ii) individuals aged 18 to 39, (iii) dichotomous dependent variable, (iv) no drug seizures measure among the right-hand-side variables.

Table 7: **Changes in Decomposition-Components**

Transition	$(\Delta_t - \Delta_{t-1})$	$(\Delta_t^{expl} - \Delta_{t-1}^{expl})$	$(\Delta_t^{unex} - \Delta_{t-1}^{unex})$	$(\Delta_t^{expl} - \Delta_{t-1}^{expl})$	$(\Delta_t^{unex} - \Delta_{t-1}^{unex})$
		Ref. Region West	Ref. Region East		
1990 to 1995	-0.938** (0.378)	-0.080 (0.150)	-0.858** (0.390)	-0.111 (0.193)	-0.828** (0.391)
1995 to 1997	0.251 (0.322)	0.130 (0.141)	0.121 (0.328)	0.185 (0.169)	0.066 (0.314)
1997 to 2000	-0.828** (0.275)	-0.387** (0.124)	-0.441 (0.295)	-0.471** (0.144)	-0.357 (0.285)
joint sig. <sup>†</sup>	0.000	0.005	0.011	0.005	0.024

**Notes:** Bootstrapped standard errors in parentheses. <sup>†</sup>P-values reported for joint tests. \*\* and \* indicate significance at the 0.05- and the 0.1-level.

firmed by one-sided tests. The dominance of the unexplained component is further underpinned by the result that  $\hat{\Delta}_t^{unex}$  significantly differs from zero at the 0.05-level for any year, while for the years 1995 and 2000 this is not the case for  $\hat{\Delta}_t^{expl}$ . Yet jointly, both the unexplained and the explained part are clearly significant.

It is interesting to note that the explained part changes its sign from 1997 to 2000. Therefore, in the most recent survey year on the basis of socioeconomic characteristics, one should expect higher prevalence rates in East Germany than in West Germany. This result apparently aligns with worsening labor-market conditions in East Germany compared to West Germany during the 1990s. Yet, the explained part is more than compensated by the unexplained part, which strongly argues for higher prevalence rates in West Germany. This may be taken as a west-east difference in culture, i.e. West Germans seem to have a greater affinity for cannabis than East Germans.

We now turn to the changes in the difference of log-mean conditional prevalence rates and the changes in its components. The corresponding figures are displayed in Table 7. For the transition from 1990 to 1995 and the one from 1997 to 2000, the west-east difference in log-mean conditional prevalence rates decreases, as is the case for the empirical difference in logs, cf. Table 2. This does not hold for the transition from 1995 to 1997. Yet, in statistical terms the rather small increase in  $\Delta_t$  does not insignificantly differ from zero. Jointly, the changes in  $\Delta_t$  as well as the changes in its components  $\Delta_t^{expl}$  and  $\Delta_t^{unex}$  are clearly significant. That is, both socioeconomic factors and culture seem to contribute to the convergence of prevalence rates in both parts of the country. For the transition from 1990 to 1995 the change in  $\Delta_t$  is dominated by its unexplained part. The explained component turns out to be rather small and even does not significantly differ from zero. Thus, in the early 1990s the convergence in prevalence rates represents almost entirely a cultural phenomenon. For the transition from 1995 to 1997, the changes in any components of  $\Delta_t$  are statistically insignificant, as is the case for  $\Delta_t$  itself. Finally both, the explained and the unexplained component, seem to contribute equally to the distinct decrease of  $\Delta_t$  from 1997 to 2000. Yet, only the former significantly differs from zero.



Table 8: Overall Changes in Decomposition-Components in the 1990s

$(\Delta_{2000} - \Delta_{1990})$	$(\Delta_{2000}^{expl} - \Delta_{1990}^{expl})$	$(\Delta_{2000}^{unex} - \Delta_{1990}^{unex})$	$(\Delta_{2000}^{expl} - \Delta_{1990}^{expl})$	$(\Delta_{2000}^{unex} - \Delta_{1990}^{unex})$
	Ref. Region West		Ref. Region East	
absolute changes				
-1.516**	-0.337**	-1.178**	-0.396**	-1.119**
(0.339)	(0.134)	(0.362)	(0.171)	(0.368)
shares in total change				
1.000	0.223**	0.777**	0.262**	0.738**
-	(0.101)	(0.101)	(0.123)	(0.123)

**Notes:** Bootstrapped standard errors in parentheses.

\*\* and \* indicate significance at the 0.05- and the 0.1-level.

In order to quantify the contribution of socioeconomic factors and culture to the overall convergence during the 1990s, we directly compare the years 2000 and 1990, see Table 8. Although both the explained and the unexplained component contribute significantly, the unexplained component accounts for roughly three-fourths in the overall convergence in log-mean conditional prevalence rates.<sup>19</sup> That is, the process of convergence remains largely unexplained.

In sum, the prevalence of cannabis seems to have converged in West and East Germany during the 1990s. The decomposition results suggest that this convergence can be related to socioeconomic characteristics only to a minor degree and therefore is mainly unexplained. One may interpret this unexplained convergence as a cultural one. In other words, West Germans and East Germans have become more alike per se in terms of cannabis abuse.

## 4.2 Robustness Checks

This subsection discusses decomposition results for several variations on the basic model, which have been mentioned in the previous sections. Firstly, we look at the results based on interval regression, see Appendix B.1 for comprehensive summary tables. Generally, in terms of significance as well as magnitudes these decomposition results are very similar to those obtained from the basic model specification. As one major deviation, if interval regression is used for estimating the model the change in prevalence rates is dominated by the unexplained component even for the transition from 1997 to the year 2000. This leads to an even more important role cultural convergence plays for the over-all change during the 1990s. That is, for the interval regression variant of the model cultural convergence accounts for more than 80% of total convergence while the explained share is less than one fifth, see Table 12.

Secondly, we examine the results based on the age pseudo-cohort born between 1951 and 1972, see Appendix B.2 for comprehensive summary tables. To a certain extent these results still resemble those for the basic specification. Yet, estimated changes in west-east deviations in prevalence rates are substantially smaller and

<sup>19</sup>Interestingly, specifications that combine pooling across regions with pooling across periods yield quite similar results. If West Germany serves as region of reference, this also holds for the variant of the model that does not pool subsamples but uses a very small set of regressors.

many of these even become statistically insignificant. The relative importance of the explained and the unexplained component, however, remains largely unaffected; see Tables 15 and 16. Thus, west-east differences in cannabis consumption appear to be more persistent during the 1990s when the focus is on age cohorts rather than age groups. This does not come as surprise, as the former approach intentionally ignores the effect of younger individuals entering the population that have spent an increasing share of adolescence in reunified Germany. Yet, as our focus is on general convergence in regional cannabis prevalence rates rather than behavioral convergence within specific age cohorts, we regard the results based on age groups as the more relevant.

Finally, we look at the results of the model that includes cannabis seizures as an additional right-hand-side variable in order to account for regional variations in the supply of illicit drugs, see Appendix B.3 for comprehensive summary tables. Due to missing information, this model can only consider the years 1995, 1997, and 2000. Yet, for these years the inclusion of cannabis seizures to the list of regressors exerts virtually no effects on the decomposition results; see Table 18. This corresponds to the regression results that – with the exception of the year 1997 – do not display any significant correlation of individual cannabis participation and regional cannabis seizures; see Table 17. One might explain this finding by the limitations of the regional drug seizures measure used; cf. Section 2.3. Nevertheless, this result provides some reassurance for the unexplained component capturing a cultural phenomenon.

## 5 Conclusions

Since the reunification of Germany in 1990 there has been an intense debate on about whether both parts of the country will soon develop a common “cultural identity” or whether cultural differences that have developed through forty years of separation are deeply rooted and are likely to persist for decades. This paper contributes to this discussion with a special focus on the issue of cannabis abuse. It has been shown that prevalence rates of cannabis consumption have, in fact, converged in West and East Germany. More importantly, decomposition results suggest that this convergence can only weakly be related to socioeconomic characteristics. This result proves to be robust to several variations on the model. Convergence, therefore, represents first of all a cultural phenomenon. That is, at least with respect to cannabis abuse, West and East Germans did become more similar per se during the 1990s.

Convergence in substance abuse that goes along with an increase in prevalence rates seems to be a rather undesirable manifestation of cultural convergence. Moreover, convergence in cannabis consumption represents a rather small facet of overall cultural convergence. Nevertheless, as the consumption of illicit drugs is strongly related to “youth culture” it may serve as an especially illuminative indicator for a general process of convergence that might continue for the future since the younger age cohorts are more likely to develop a joint “cultural identity” that is not conditioned by the two different political and social systems that existed in Germany prior to 1990.

## References

- Bauer, T.K. and M. Sinning (2008). [An Extension of the Blinder-Oaxaca Decomposition to Non-Linear Models](#), *AStA - Advances in Statistical Analysis* 92(2), 197-206.
- Becker, M. (2005). [Deutsche koksen ungeahnte Mengen](#), Spiegel Online, November 9th, 2005.
- Blinder, A.S. (1973). [Wage Discrimination: Reduced Form and Structural Estimates](#), *Journal of Human Resources* 8(4), 436-455.
- Burda, M.C. and Ch.M. Schmidt (1997). [Getting behind the East-West Wage Differential – Theory and Evidence](#). In: R. Pohl and H. Schneider (eds.): *Wandeln oder weichen – Herausforderungen der wirtschaftlichen Integration für Deutschland*, 170-201. IWH-Halle.
- Cameron, A.C. and P.K. Trivedi (2005). [Microeconometrics – Methods and Applications](#). Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo: Cambridge University Press.
- Csémy, L., L. Kubička and A. Nociar (2002). [Drug Scene in the Czech Republic and Slovakia during the Period of Transformation](#), *European Addiction Research* 8(4), 159-165.
- DeSimone, J. and M. Farrelly (2003). [Price and Enforcement Effects on Cocaine and Marijuana Demand](#), *Economic Inquiry* 41(1), 98-115.
- Fairlie, R.W. (1999). [The Absence of the African-American Owned Business: An Analysis of the Dynamics of Self-Employment](#), *Journal of Labor Economics* 17(1), 80-108.
- Fairlie, R.W. (2005). [An Extension of the Blinder-Oaxaca Decomposition Technique to Logit and Probit Models](#), *Journal of Economic and Social Measurement* 30(4), 305-316.
- Hoyt, G.M. and F.J. Chaloupka (1994). [Effect of Survey Conditions on Self-Reported Substance Use](#), *Contemporary Economic Policy* 12(3), 109-121.
- Hüsler, G., E. Werlen and B. Plancherel (2004). [Der Einfluss psychosozialer Faktoren auf den Cannabiskonsum](#), *Suchtmed* 6(3), 221-235.
- Jann, B. (2005). [Standard Errors for the Blinder-Oaxaca Decomposition](#), 3rd German Stata Users' Group Meeting, Berlin 2005, Stata Users Group.
- Kraus, L. and R. Augustin (2001). [Population Survey on the Consumption of Psychoactive Substances in the German Adult Population 2000](#), *Sucht - Zeitschrift für Wissenschaft und Praxis* 47, Sonderheft 1, 1-88.

- Lagerspetz, M. and J. Moskalewicz (2002). [Drugs in the Postsocialist Transitions of Estonia, Latvia, Lithuania and Poland](#), *European Addiction Research* 8(4), 177-183.
- Mensch, B.S. and D.B. Kandel (1988). [Underreporting of Substance Use in a longitudinal Youth Cohort – individual and interviewer effects](#), *Public Opinion Quarterly* 52, 100-124.
- Oaxaca, R.L. (1973). [Male-Female Wage Differentials in Urban Labor Markets](#), *International Economic Review* 14(3), 693-709.
- Perkonigg, A., R. Lieb and H.U. Wittchen (1998). [Substance Use, Abuse and Dependence in Germany – A Review of Selected Epidemiological Data](#), *European Addiction Research* 4(1-2), 8-17.
- Pudney, S. (2004). [Keeping off the Grass? An Econometric Model of Cannabis Consumption in Britain](#), *Journal of Applied Econometrics* 19(4), 435-453.
- Reißig, M. (1991). Jugend und Suchtmittel. In: W. Friedrich and H. Griese (eds.): *Jugend und Jugendforschung in der DDR*, 201-209. Opladen: Leske & Budrich.
- Saffer, H. and F. Chaloupka (1999). [The Demand for Illicit Drugs](#), *Economic Inquiry* 37(3), 401-411.
- Tylor, E.B. (1903). *Primitive Culture: Researches into the Development of Mythology, Philosophy, Religion, Language, Art, and Custom*. London: Murphy.
- van Ours, J.C. and J. Williams (2007). [Cannabis Prices and Dynamics of Cannabis Use](#), *Journal of Health Economics* 26(3), 578-596.
- Zuccato, E., C. Chiabrando, S. Castiglioni, R. Bagnati and R. Fanelli (2008). [Estimating Community Drug Abuse by Wastewater Analysis](#), *Environmental Health Perspectives* 116(8), 1027-1032.

# Appendix

## A The Questionnaire

This appendix comprises those questions from the questionnaires which the dependent variables are calculated from. The original and complete German-language questionnaires are available from “Central Archive for Empirical Social Research, University Cologne”; <http://www.gesis.org/en/za>. The subsequent section displays an English-language translation. The relevant questions address a large number of substances in a uniform way, yet for the sake of brevity, here we only display cannabis.

### A.1 Questionnaire for the Year 1990

**Question 72:** See the following list of drugs and pharmaceuticals, i.e. substances whose consumption may result in intoxication or a sense of well-being. Please tick those substances you have tried (not in the context of a medical treatment).

Marihuana, Haschisch (Grass, Shit, Pot) .....   
 : .....

*The following questions ... are aimed only at individuals who have used psychoactive substances at least once.*

**Question 78:** When did you last consume one of the following substances in order to intoxicate yourself?

	less than 1 month	1-5 months	6-12 months	1-2 years	2 years and longer
Marihuana/Hashish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
: .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*The following questions are only aimed at those having consumed psychoactive during the last twelve months.*

**Question 79:** Which substances have you consumed how often during the last twelve months, in order to intoxicate yourself?

	1×	2×	2-5×	6-9×	10-19×	20-39×	40-59×	60× and more
Marihuana/Hashish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
: .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### A.2 Questionnaire for the Year 1995

**Question 62:** See the following list of illicit drugs. Which ones have you ever tried? Please encircle any substance you have ever tried.

Haschisch, Marihuana ..... 01  
 : ..... 0x  
 until now I have never tried any illicit drugs ..... 96

*To those who have ever tried illicit drugs or sniffing agents:*

**Question 66:** When did you last consume the following substances? Please encircle the appropriate number or fill in the number of years.

	Last consumed: during the last <b>30 days</b>	during the last <b>12 months</b>	some time ago, for the last time
Haschisch, Marihuana	1	2	_____ years ago
:	1	2	_____ years ago

To those who have consumed one of the aforementioned psychoactive substances during the last 30 days or the last 12 months:

**Question 67:** How often have you consumed the following substances during the last 12 months?

	Over all, during the last 12 months I have consumed:								
	once	2-5 times	6-9 times	10-19 times	20-59 times	60-99 times	100-199 times	200 times and more	never
Haschisch, Marihuana	1	2	3	4	5	6	7	8	9
:	1	2	3	4	5	6	7	8	9

### A.3 Questionnaire for the Year 1997

**Question 57:** See the following list of illicit drugs. Which ones have you ever tried? Please encircle any substance you have ever tried.

Haschisch, Marihuana	.....0
:	.....0
until now I have not tried any of these drugs	.....9

To those who have ever tried illicit drugs or sniffing agents:

**Question 61:** When did you last consume the following substances? Please encircle the appropriate number or fill in the number of years.

	Last consumed:			
	during the last 30 days	during the last 12 months	some time ago, for the last time	I have never tried
Haschisch, Marihuana	1	2	_____ years ago	0
:	1	2	_____ years ago	0

To those who have consumed one of the aforementioned psychoactive substances during the last 30 days or the last 12 months:

**Question 63:** How often have you consumed the following substances during the last 12 months?

	Over all, during the last 12 month I have consumed:								
	once	2-5 times	6-9 times	10-19 times	20-59 times	60-99 times	100-199 times	200 times and more	never
Haschisch, Marihuana	1	2	3	4	5	6	7	8	9
:	1	2	3	4	5	6	7	8	9

### A.4 Questionnaire for the Year 2000

**Question 81:** See the following list of drugs. Please tick any substance you have ever tried.

Haschisch, Marihuana	..... <input type="checkbox"/>
:	..... <input type="checkbox"/>
Until now I have not tried any of these drugs	..... <input type="checkbox"/>

To those who have ever tried drugs:

**Question 86:** When did you last consume the following drugs? Please tick the appropriate box or fill in the number of years.

	Last consumed:			
	during the last 30 days	during the last 12 months	some time ago, for the last time	I have never tried
Haschisch, Marihuana	<input type="checkbox"/>	<input type="checkbox"/>	_____ years ago	<input type="checkbox"/>
:	<input type="checkbox"/>	<input type="checkbox"/>	_____ years ago	<input type="checkbox"/>

To those who have consumed one of the aforementioned drugs during the last 12 months:

**Question 88:** How often have you consumed the following substances during the last 12 months? Please tick once in any row.

	Over all, during the last 12 month I have consumed:								
	once	2-5 times	6-9 times	10-19 times	20-59 times	60-99 times	100-199 times	200 times and more	never
Haschisch, Marihuana	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## B Results for Alternative Model Specifications

### B.1 Results for the Interval Regression Specification

This appendix displays results for the model variant that uses information on the frequency of cannabis use and therefore employs interval- instead of probit regression for estimating the coefficients  $\beta$ . These estimates, see Table 9, are not directly comparable to those for the basic model specification. In order to allow for this, raw coefficient estimates have to be scaled by the factor  $\hat{\sigma}^{-1}$ . In contrast, decomposition results, see Tables 10 through 12, can directly be compared.

Table 9: Interval Regression Pooled by Region

	Year 1990		Year 1995		Year 1997		Year 2000	
	Coeff.	Std. E.	Coeff.	Std. E.	Coeff.	Std. E.	Coeff.	Std. E.
east	-33.292**	7.314	-33.306**	8.062	-32.095**	10.134	-12.354**	5.146
female	-10.694**	2.117	-31.325**	5.174	-16.436**	5.356	-16.739**	3.628
age	1.899	2.335	-0.253	4.478	5.224	4.738	-7.076**	3.015
age <sup>2</sup> /100	-6.263	4.335	-3.595	7.729	-10.174	7.901	9.577*	5.151
married	-18.336**	4.396	-24.904**	7.110	-25.943**	11.427	-14.134**	5.943
living with partner	-5.299	3.840	2.790	6.560	-10.538	7.513	-3.667	5.381
living with parents	-7.535*	3.909	7.472	7.194	-1.742	7.331	-9.238	5.707
living with somebody else	2.835	3.730	16.778**	5.977	-0.396	7.688	1.439	5.185
number of children	-2.218	2.457	-5.677*	3.252	0.053	5.411	-3.372	3.116
pupil	5.352	4.471	14.249	13.028	25.557*	14.247	19.544**	7.153
student	-4.934	3.919	-5.793	9.585	17.555	10.910	10.145	6.310
apprentice	-1.792	3.242	0.897	10.251	16.088*	9.357	9.951	6.771
employed full-time	-3.635	3.109	-5.219	8.764	6.742	8.134	-5.667	5.775
employed part-time	6.419	4.496	11.458	11.175	8.207	9.647	-1.889	7.012
employed marginally	6.273	4.637	8.393	13.056	-1.791	8.946	13.999**	5.376
jobless	17.283**	5.561	4.426	11.300	32.410**	12.194	3.223	8.185
number of months unemployed	0.819**	0.168	0.922**	0.318	0.454	0.353	0.916**	0.237
blue collar	2.230	2.890	25.507**	7.676	11.799	9.989	10.881**	5.234
white collar	-5.074	3.240	16.381**	7.225	5.602	8.473	4.398	5.061
self-employed	8.745*	4.908	39.843**	9.563	28.734**	11.121	12.626*	7.178
low degree of schooling	-2.021	6.908	4.577	9.971	-23.862**	11.576	-5.297	9.673
intermediate degree of schooling	0.012	7.078	9.994	9.379	-5.532	11.241	2.822	8.717
high degree of schooling	3.726	7.217	9.978	10.616	5.193	11.771	6.411	9.087
university degree	-5.276	8.346	15.903	11.260	-8.055	12.151	0.039	9.755
income 1000 DM to 1500 DM	-3.276	4.806	7.881	8.517	-6.206	10.012	-1.631	6.316
income 1500 DM to 2000 DM	5.365	4.532	-8.146	8.856	-12.805	11.344	8.597	7.367
income 2000 DM to 2500 DM	0.373	4.703	-21.064**	9.237	-20.356**	10.192	4.158	6.909
income 2500 DM to 3000 DM	3.178	4.731	-28.489**	10.079	-17.196	10.810	2.635	6.809
income 3000 DM to 4000 DM	0.682	4.637	-21.608**	9.132	-14.542	10.419	-1.530	6.609
income 4000 DM to 5000 DM	-3.215	4.820	-10.435	8.942	-19.910*	10.779	-2.359	7.083
income 5000 DM to 6000 DM	3.993	5.222	-5.505	9.961	-27.127**	12.985	10.239	7.647
income more than 6000 DM	10.024**	4.982	-30.897**	10.723	-13.497	11.304	-4.631	6.926
city/town pop. 2 to 5 thousand	-2.124	4.222	8.214	15.153	30.384**	15.266	22.993**	8.978
city/town pop. 5 to 20 thousand	1.684	3.587	19.807	12.994	25.752**	13.117	22.845**	8.721
city/town pop. 20 to 50 thousand	1.459	3.770	17.310	13.425	29.474**	13.178	19.461**	8.632
city/town pop. 50 to 100 thousand	9.950**	4.482	27.231**	13.730	17.868	14.028	24.178**	10.759
city/town pop. 100 to 500 thousand	4.588	3.803	34.971**	13.059	31.021**	13.543	21.658**	9.099
city/town pop. more than 500 thousand	14.097**	4.033	42.235**	13.241	36.059**	13.754	27.569**	8.526
constant	-64.869**	32.106	-59.247	67.332	-148.324**	72.329	40.309	43.204
$\sigma$	40.183**	2.801	49.895**	4.227	50.388**	5.727	45.046**	3.773
number of observations		13 386		3 576		3 680		3 315
log-likelihood		-23 021		-8 471		-8 247		-8 915
joint significance (P-value)		0.000		0.000		0.000		0.000

**Notes:** Regressions are weighted by inverse sampling probabilities.

\*\* and \* indicate significance at the 0.05- and the 0.1-level.

Table 10: Decomposition of Cannabis Prevalence (interval regression)

Year	$\Delta_t$	$\Delta_t^{expl}$		$\Delta_t^{unex}$	
		Ref.	Region West	Ref.	Region East
1990	2.003** (0.270)	0.172 (0.124)	1.831** (0.295)	0.217 (0.165)	1.786** (0.306)
1995	1.105** (0.227)	0.049 (0.101)	1.057** (0.221)	0.042 (0.134)	1.064** (0.228)
1997	1.376** (0.207)	0.163 (0.101)	1.213** (0.231)	0.243** (0.122)	1.133** (0.226)
2000	0.311** (0.154)	-0.118 (0.081)	0.429** (0.171)	-0.119 (0.091)	0.429** (0.177)
joint significance <sup>†</sup>	0.000	0.139	0.000	0.112	0.000

**Notes:** Bootstrapped standard errors in parentheses. <sup>†</sup>P-values reported for joint tests. \*\* and \* indicate significance at the 0.05- and the 0.1-level.

Table 11: Changes in Decomposition-Components (interval regression)

Transition	$(\Delta_t - \Delta_{t-1})$	$(\Delta_t^{expl} - \Delta_{t-1}^{expl})$		$(\Delta_t^{unex} - \Delta_{t-1}^{unex})$	
		Ref.	Region West	Ref.	Region East
1990 to 1995	-0.898** (0.353)	-0.123 (0.160)	-0.775** (0.369)	-0.176 (0.213)	-0.722* (0.381)
1995 to 1997	0.271 (0.307)	0.115 (0.143)	0.156 (0.320)	0.201 (0.182)	0.069 (0.320)
1997 to 2000	-1.065** (0.258)	-0.281** (0.129)	-0.784** (0.287)	-0.362** (0.152)	-0.703** (0.287)
joint sig. <sup>†</sup>	0.000	0.091	0.000	0.074	0.001

**Notes:** Bootstrapped standard errors in parentheses. <sup>†</sup>P-values reported for joint tests. \*\* and \* indicate significance at the 0.05- and the 0.1-level.

Table 12: Overall Changes (interval regression)

	$(\Delta_{2000} - \Delta_{1990})$	$(\Delta_{2000}^{expl} - \Delta_{1990}^{expl})$		$(\Delta_{2000}^{unex} - \Delta_{1990}^{unex})$	
		Ref.	Region West	Ref.	Region East
absolute changes	-1.693** (0.311)	-0.290** (0.148)	-1.403** (0.341)	-0.336* (0.188)	-1.357** (0.354)
shares in total change	1.000 -	0.171* (0.092)	0.829** (0.092)	0.198* (0.115)	0.802** (0.115)

**Notes:** Bootstrapped standard errors in parentheses. \*\* and \* indicate significance at the 0.05- and the 0.1-level.



## B.2 Results for the Age Pseudo-Cohort born 1951 to 1972

This appendix displays results for the model variant that uses data for the pseudo-cohort of individuals born between 1951 and 1972 instead of individuals aged 18 to 39 years. Since in the year 2000 no sampled individual from this cohort still attended school, the variable “pupil” is skipped from this specification.

Table 13: Probit Regression Pooled by Region (pseudo-cohort)

	Year 1990		Year 1995		Year 1997		Year 2000	
	Coeff.	Std. E.	Coeff.	Std. E.	Coeff.	Std. E.	Coeff.	Std. E.
east	-0.787**	0.174	-0.672**	0.176	-0.491**	0.209	-0.434**	0.179
female	-0.281**	0.050	-0.461**	0.111	-0.361**	0.133	-0.333**	0.101
age	0.012	0.058	-0.012	0.093	0.134	0.124	0.101	0.115
age <sup>2</sup> /100	-0.097	0.108	-0.050	0.143	-0.220	0.176	-0.186	0.156
married	-0.444**	0.098	-0.540**	0.134	-0.630**	0.163	-0.314**	0.135
living with partner	-0.107	0.091	-0.048	0.133	-0.082	0.152	-0.074	0.146
living with parents	-0.155	0.096	-0.087	0.165	-0.016	0.207	-0.093	0.200
living with somebody else	0.089	0.093	0.230*	0.137	0.324	0.206	0.009	0.182
number of children	-0.077	0.060	-0.139**	0.065	0.032	0.076	-0.092	0.059
student	-0.128	0.096	0.274	0.235	0.375	0.261	0.300	0.238
apprentice	-0.072	0.073	0.581**	0.239	0.506	0.381	0.066	0.309
employed full-time	-0.084	0.077	0.000	0.191	0.271	0.190	-0.216	0.159
employed part-time	0.148	0.111	0.262	0.226	0.033	0.217	-0.012	0.182
employed marginally	0.162	0.119	0.300	0.287	0.231	0.272	0.257	0.205
jobless	0.366**	0.123	0.051	0.253	0.166	0.250	-0.166	0.251
number of months unemployed	0.021**	0.004	0.026**	0.006	0.010	0.006	0.020**	0.005
blue collar	0.049	0.077	0.406*	0.209	0.077	0.290	0.385*	0.230
white collar	-0.118	0.082	0.311	0.199	0.052	0.262	0.334	0.214
self-employed	0.258**	0.128	0.852**	0.220	0.448	0.275	0.528**	0.240
low degree of schooling	-0.088	0.177	0.248	0.275	0.489	0.333	0.199	0.315
intermediate degree of schooling	0.001	0.180	0.391	0.283	0.836**	0.333	0.236	0.311
high degree of schooling	0.099	0.184	0.296	0.303	1.005**	0.350	0.214	0.329
university degree	-0.142	0.213	0.510*	0.301	0.707**	0.351	0.314	0.325
income 1000 DM to 1500 DM	-0.111	0.122	0.028	0.194	-0.383	0.260	0.076	0.370
income 1500 DM to 2000 DM	0.097	0.118	-0.291	0.208	-0.597**	0.296	0.158	0.368
income 2000 DM to 2500 DM	-0.090	0.120	-0.578**	0.215	-0.607**	0.293	0.090	0.359
income 2500 DM to 3000 DM	0.005	0.122	-0.494**	0.225	-0.745**	0.311	0.256	0.359
income 3000 DM to 4000 DM	-0.073	0.120	-0.330	0.210	-0.819**	0.299	0.013	0.360
income 4000 DM to 5000 DM	-0.157	0.125	-0.297	0.220	-0.954**	0.312	0.125	0.371
income 5000 DM to 6000 DM	0.031	0.133	0.054	0.250	-0.928**	0.384	0.051	0.380
income more than 6000 DM	0.173	0.124	-0.667**	0.280	-0.740**	0.363	0.018	0.386
city/town pop. 2 to 5 thousand	-0.071	0.107	-0.014	0.413	0.286	0.348	0.339	0.244
city/town pop. 5 to 20 thousand	0.039	0.092	0.615*	0.330	0.189	0.319	0.362*	0.217
city/town pop. 20 to 50 thousand	0.059	0.097	0.467	0.350	0.385	0.320	0.062	0.218
city/town pop. 50 to 100 thousand	0.204*	0.105	0.555	0.355	0.211	0.327	-0.062	0.438
city/town pop. 100 to 500 thousand	0.133	0.098	0.813**	0.334	0.540*	0.313	0.347	0.230
city/town pop. more than 500 thousand	0.312**	0.098	0.962**	0.343	0.622*	0.321	0.400*	0.209
constant	-1.025	0.771	-1.460	1.603	-4.050*	2.141	-3.400	2.161
number of observations	13 400		4 038		4 045		3 992	
log-likelihood	-2 001.2		-547.8		-495.9		-477.6	
joint significance (P-value)	0.000		0.000		0.000		0.000	

**Notes:** Regressions are weighted by inverse sampling probabilities.

\*\* and \* indicate significance at the 0.05- and the 0.1-level.

Table 14: Decomposition of Cannabis Prevalence (pseudo-cohort)

Year	$\Delta_t$	$\Delta_t^{expl}$	$\Delta_t^{unex}$	$\Delta_t^{expl}$	$\Delta_t^{unex}$
		Ref. Region West		Ref. Region East	
1990	1.912** (0.301)	0.193* (0.111)	1.720** (0.322)	0.247* (0.146)	1.666** (0.327)
1995	1.241** (0.312)	0.173 (0.129)	1.068** (0.304)	0.167 (0.174)	1.074** (0.318)
1997	0.880** (0.233)	0.006 (0.132)	0.874** (0.245)	0.024 (0.162)	0.856** (0.239)
2000	0.815** (0.362)	-0.056 (0.149)	0.871** (0.398)	-0.069 (0.187)	0.885** (0.427)
joint significance <sup>†</sup>	0.000	0.289	0.000	0.416	0.000

**Notes:** Bootstrapped standard errors in parentheses. <sup>†</sup>P-values reported for joint tests. \*\* and \* indicate significance at the 0.05- and the 0.1-level.

Table 15: Changes in Decomposition-Components (pseudo-cohort)

Transition	$(\Delta_t - \Delta_{t-1})$	$(\Delta_t^{expl} - \Delta_{t-1}^{expl})$	$(\Delta_t^{unex} - \Delta_{t-1}^{unex})$	$(\Delta_t^{expl} - \Delta_{t-1}^{expl})$	$(\Delta_t^{unex} - \Delta_{t-1}^{unex})$
		Ref. Region West		Ref. Region East	
1990 to 1995	-0.671 (0.433)	-0.020 (0.170)	-0.652 (0.443)	-0.079 (0.227)	-0.592* (0.456)
1995 to 1997	-0.361 (0.389)	-0.167 (0.184)	-0.194 (0.391)	-0.143 (0.237)	-0.218 (0.398)
1997 to 2000	-0.064 (0.431)	-0.062 (0.199)	-0.002 (0.468)	-0.093 (0.247)	0.029* (0.489)
joint sig. <sup>†</sup>	0.035	0.453	0.181	0.535	0.231

**Notes:** Bootstrapped standard errors in parentheses. <sup>†</sup>P-values reported for joint tests. \*\* and \* indicate significance at the 0.05- and the 0.1-level.

Table 16: Overall Changes (pseudo-cohort)

	$(\Delta_{2000} - \Delta_{1990})$	$(\Delta_{2000}^{expl} - \Delta_{1990}^{expl})$	$(\Delta_{2000}^{unex} - \Delta_{1990}^{unex})$	$(\Delta_{2000}^{expl} - \Delta_{1990}^{expl})$	$(\Delta_{2000}^{unex} - \Delta_{1990}^{unex})$
	Ref. Region West			Ref. Region East	
absolute changes	-1.097** (0.471)	-0.249 (0.186)	-0.848* (0.512)	-0.316 (0.237)	-0.781 (0.538)
shares in total change	1.000 —	0.227 (0.198)	0.773** (0.198)	0.288 (0.254)	0.712** (0.254)

**Notes:** Bootstrapped standard errors in parentheses. \*\* and \* indicate significance at the 0.05- and the 0.1-level.

### B.3 Results for the Model with Cannabis Seizures Included

This appendix displays results for the model variant that includes cannabis seizures as an additional right-hand-side variable. This variable is available at the Federal State (Bundesländer) level and it is measured as kilogram per 1000 inhabitants. For the year 1990 such figures are missing for the majority of East German states. Thus, this model variant only considers the years 1995, 1997, and 2000.

Table 17: Probit Regression Pooled by Region (cannabis seizures)

	Year 1995		Year 1997		Year 2000	
	Coeff.	Std. E.	Coeff.	Std. E.	Coeff.	Std. E.
east	-0.538**	0.156	-0.513**	0.188	-0.356**	0.112
female	-0.521**	0.100	-0.294**	0.105	-0.319**	0.074
age	0.065	0.091	0.179*	0.101	-0.167**	0.068
age <sup>2</sup> /100	-0.192	0.157	-0.325*	0.167	0.232**	0.117
married	-0.549**	0.130	-0.499**	0.189	-0.348**	0.131
living with partner	0.056	0.126	-0.210	0.150	-0.075	0.122
living with parents	0.104	0.137	-0.026	0.149	-0.207	0.128
living with somebody else	0.359**	0.123	0.005	0.165	0.036	0.117
number of children	-0.104*	0.063	-0.029	0.095	-0.107	0.066
pupil	0.436	0.273	0.446	0.272	0.457**	0.153
student	0.072	0.201	0.454**	0.213	0.265*	0.138
apprentice	0.109	0.217	0.389*	0.202	0.251*	0.149
employed full-time	-0.066	0.172	0.132	0.161	-0.120	0.124
employed part-time	0.255	0.229	0.114	0.196	-0.018	0.159
employed marginally	0.147	0.271	0.025	0.199	0.380**	0.125
jobless	0.072	0.228	0.598**	0.217	0.100	0.182
number of months unemployed	0.019**	0.006	0.004	0.007	0.022**	0.005
blue collar	0.396**	0.155	0.190	0.193	0.240**	0.117
white collar	0.271*	0.158	0.135	0.173	0.111	0.115
self-employed	0.773**	0.188	0.545**	0.216	0.241	0.165
low degree of schooling	0.074	0.195	-0.677**	0.234	-0.036	0.224
intermediate degree of schooling	0.210	0.193	-0.284	0.223	0.146	0.201
high degree of schooling	0.167	0.212	-0.190	0.233	0.245	0.207
university degree	0.368	0.231	-0.380	0.247	0.167	0.226
income 1000 DM to 1500 DM	0.152	0.170	-0.075	0.202	-0.004	0.145
income 1500 DM to 2000 DM	-0.160	0.179	-0.307	0.223	0.208	0.160
income 2000 DM to 2500 DM	-0.385**	0.179	-0.367*	0.195	0.119	0.156
income 2500 DM to 3000 DM	-0.524**	0.192	-0.394*	0.214	0.135	0.158
income 3000 DM to 4000 DM	-0.281	0.179	-0.333	0.203	-0.026	0.149
income 4000 DM to 5000 DM	-0.131	0.181	-0.403*	0.206	0.013	0.163
income 5000 DM to 6000 DM	-0.034	0.210	-0.505**	0.254	0.210	0.164
income more than 6000 DM	-0.439**	0.209	-0.221	0.233	-0.055	0.156
city/town pop. 2 to 5 thousand	0.020	0.308	0.543*	0.296	0.572**	0.200
city/town pop. 5 to 20 thousand	0.218	0.253	0.478*	0.261	0.504**	0.185
city/town pop. 20 to 50 thousand	0.139	0.264	0.669**	0.272	0.403**	0.183
city/town pop. 50 to 100 thousand	0.404	0.267	0.408	0.292	0.710**	0.260
city/town pop. 100 to 500 thousand	0.475*	0.249	0.608**	0.273	0.490**	0.196
city/town pop. more than 500 thousand	0.660**	0.250	0.595**	0.276	0.575**	0.180
cannabis seizures	0.005	0.040	0.184**	0.065	0.025	0.127
constant	-2.042	1.343	-3.835**	1.560	0.903	0.984
number of observations		3 584		3 682		3 318
log-likelihood		-734.1		-739.5		-860.0
joint significance (P-value)		0.000		0.000		0.000

**Notes:** Regressions are weighted by inverse sampling probabilities.

\*\* and \* indicate significance at the 0.05- and the 0.1-level.

Table 18: Decomposition of Cannabis Prevalence (cannabis seizures)

Year	$\Delta_t$	$\Delta_t^{expl}$		$\Delta_t^{unex}$	
		Ref.	Region West	Ref.	Region East
1995	0.984** (0.226)	0.119 (0.100)	0.865** (0.218)	0.144 (0.125)	0.840** (0.216)
1997	1.234** (0.229)	0.264** (0.101)	0.970** (0.245)	0.350** (0.116)	0.884** (0.228)
2000	0.406** (0.152)	-0.141* (0.074)	0.548** (0.164)	-0.146* (0.088)	0.552** (0.171)
joint significance <sup>†</sup>	0.000	0.008	0.000	0.004	0.000

**Notes:** Bootstrapped standard errors in parentheses. <sup>†</sup>P-values reported for joint tests. \*\* and \* indicate significance at the 0.05- and the 0.1-level.

Table 19: Changes in Decomposition-Components (cannabis seizures)

Transition	$(\Delta_t - \Delta_{t-1})$	$(\Delta_t^{expl} - \Delta_{t-1}^{expl})$		$(\Delta_t^{unex} - \Delta_{t-1}^{unex})$	
		Ref.	Region West	Ref.	Region East
1995 to 1997	0.250 (0.322)	0.145 (0.142)	0.106 (0.328)	0.206 (0.170)	0.044 (0.314)
1997 to 2000	-0.827** (0.275)	-0.405** (0.125)	-0.422 (0.295)	-0.496** (0.146)	-0.331 (0.285)
joint sig. <sup>†</sup>	0.005	0.003	0.276	0.002	0.409

**Notes:** Bootstrapped standard errors in parentheses. <sup>†</sup>P-values reported for joint tests. \*\* and \* indicate significance at the 0.05- and the 0.1-level.

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The Editor