Economics Discussion Papers
The Open-Access, Open-Assessment E-Journal

Discussion Paper 2008-8
March 17, 2008

West-East Convergence in the Prevalence of Illicit Drugs: Socioeconomics or Culture?

Harald Tauchmann

RWI Essen

Please cite the corresponding journal article:
http://www.economics-ejournal.org/economics/journalarticles/2008-29

Abstract:

In contrast to West-Germany, illicit drugs were virtually absent in the East-Germany until 1990. Yet, after the collapse of the former GDR, East-Germany was expected to encounter a sharp increase in the prevalence of substance abuse. By analyzing individual data, we find that East-Germany largely caught up with West-Germany's ever-growing prevalence of illicit drugs 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 just 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 drug consumption.

JEL: I12, P36, P23

Keywords: Illicit drugs; west-east convergence; decomposition

Correspondence:
Harald Tauchmann, Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI Essen), Hohenzollernstraße 1-3, D-45128 Essen, Germany. Fax: +49-201-8149-200.
Email: harald.tauchmann@rwi-essen.de

The author is grateful to Boris Augurzky, Silja Göhlmann, Jochen Kluve, Ismo Linnosmaa, Sandra Schaffner, Christoph M. Schmidt, Mathias Sinning, and Marcus Tamm for many useful comments. Any errors are my own.

1 Introduction

In the former East-German GDR the consumption of illicit drugs that are widespread in western societies, such as cannabis, cocaine etc., was virtually absent (cf. REIßIG 1991).[1] 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.[2] Yet, when in 1989 the Berlin Wall fell 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.[3]

This process of convergence may reflect two different matters. 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

[1] However, the abuse of legal psychoactive substances like analgesics and - primarily - alcohol was widespread in East-Germany prior to 1990.

[2] 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.

[3] An increase in the consumption of illicit drugs can be observed for other post-socialist European countries for the 1990s too; cf. LAGERSPETZ & MOSKALEWICZ (2002) and CSÉMY et al. (2002).

empirical studies (cf. PUDNEY 2004 and HÜSLER et al. 2004). In addition, western Germany 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. It is possible to statistically 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.[4] One may therefore interpret a convergence in drug consumption that is not related to socioeconomic characteristics as a facet of cultural convergence. 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. To contribute to this discussion, the question of whether the cultural gap in substance abuse has closed is the main focus of our analysis.

For this purpose, we decompose the west-east difference in the prevalence of il-

[4]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 insights. In general, various different definitions of the term "culture" can be found. A classical definition 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."

licit drugs 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 drug 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 & 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"[5] collected by IFT (Institute for Therapy Research) Munich; see KRAUS & AUGUSTIN (2001) for a detailed description. To the author's knowledge, this data represents the most comprehensive source of information on substance abuse among adults in Germany. The Population Survey on the Con-

[5] "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`.

sumption 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. 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 allow for comparisons across years, we only consider respondents aged 18 to 39. We also exclude all 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.

Unfortunately, not only was the target population substantially modified, but so were the questionnaires. In particular, the number of questions was consider-

ably reduced in 1995, eliminating almost all concerned with the respondents' family background. Moreover, almost all the questions were substantially rephrased. Therefore, it is only possible to ensure consistency across waves for a limited number of variables.

2.2 The 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. With respect to all these substances, 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 ago are classified as drug consumers. Moreover, since it was hardly possible to have experience with illicit drugs in the

Table 1: **Mean twelve-month prevalence of illicit drugs**

year	West			East		
	Mean	Std. Error	# of obs.	Mean	Std. Error	# of obs.
1990	0.047	0.002	14 414	0.006	0.002	1 765
1995	0.092	0.006	3 145	0.031	0.010	616
1997	0.082	0.007	3 219	0.037	0.012	746
2000	0.107	0.006	3 014	0.077	0.011	590

Note: Weighted by inverse sampling probability.

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.

The prevalence rates of most of the substances mentioned above are quite low. So we do not consider them individually, but use the aggregate measure "twelve-month prevalence of (any) illicit drug" for our analysis. Yet, aggregating several different substances does not allow for using the frequency of use as left-hand-side variable. The reason for this is that frequencies are interval-coded. This does not allow for a proper aggregation across different substances.

We now examine the ordinary empirical twelve-month prevalence of illicit drugs stratified by region and year. It is quite clear that the prevalence of substance abuse 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 illicit drugs. By the

Table 2: **Unconditional west-east differences in twelve-month 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	7.782	2.487	2.052	0.312
1995	0.061	0.011	2.928	0.910	1.074	0.311
1997	0.044	0.014	2.170	0.710	0.775	0.327
2000	0.030	0.013	1.383	0.217	0.324	0.157

Note: Weighted by inverse sampling probability.

mid 1990s, this number rose to more than three percent. Finally, in 2000, more than seven percent of East-Germans stated having used illicit psychoactive substances in the last twelve months prior to taking the survey. Yet, somewhat surprisingly, a similar increase in drug consumption had also taken place in western Germany; see Table 1. While the twelve-month prevalence was lower than five percent in 1990, it reached nine percent by the mid 1990s and exceeded ten percent by the year 2000. In fact, the west-east gap in substance 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 & 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 & 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 illicit drugs during the twelve months prior to taking the survey. This figure drops to about three in 1995 and to about two in 1997. In 2000 West-Germans were just 1.4 times more likely to take illicit drugs than their East-German counterparts; see Table 2. Moreover, the gap in the prevalence of illicit drugs 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 of convergence that is revealed through considering ratios of 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.[6]

[6]Some additional variables such as body hight and weight and self assessed health are also reported, yet are not used as right-hand-side variables in our analysis.

Table 3: **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 3. While the average time spent in unemployment in West-Germany remained rather stable in the 1990s, this figure increased dramatically in East-Germany. In the beginning of the decade, East-German respondents had experienced unemployment to 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.[7] 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.[8] We, therefore, do not include this variable to the list of right-hand-side variables.

[7]The empirical evidence on the effects drug prices on drug consumption is mixed, cf. VAN OURS & WILLIAMS (2007), DESIMONE & FARRELLY (2003), and SAFFER & CHALOUPKA (1999).

[8]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 sub-samples.

3 The Analytical Framework

3.1 The Decomposition Rule

In order to answer the question of whether west-east convergence in the consumption of illicit drugs 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 sub-populations. In our application, the dependent variable of interest is the dummy indicating that a respondent has consumed illicit drugs in the twelve months prior to taking the survey. The sub-populations are West-Germans and East-Germans.

If the decomposition rule is generalized to non-linear models, cf. FAIRLIE (1999 and 2003) and BAUER & SINNING (2006), it can be written:

$$\Delta_t = \Delta_t^{expl} + \Delta_t^{unex} \tag{1}$$

with

$$\Delta_t \equiv E_x\left[E(y_{it}|x_{it},\beta_t^{west})|i \in I^{west},t\right] - E_x\left[E(y_{it}|x_{it},\beta_t^{east})|i \in I^{east},t\right]$$

$$\Delta_t^{expl} \equiv E_x\left[E(y_{it}|x_{it},\beta_t^{west})|i \in I^{west},t\right] - E_x\left[E(y_{it}|x_{it},\beta_t^{west})|i \in I^{east},t\right]$$

$$\Delta_t^{unex} \equiv E_x\left[E(y_{it}|x_{it},\beta_t^{west})|i \in I^{east},t\right] - E_x\left[E(y_{it}|x_{it},\beta_t^{east})|i \in I^{east},t\right]$$

Here, the index i indicates individuals, while t indicates periods. I^{west} denotes the 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 β represents a vector of parameters. Δ_t^{expl} captures the component of differences in conditional means that is explained by socioeconomic characteristics. In other words, by Δ_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 drug consumption as they actually do have in West-Germany.[9] Δ_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 Δ_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.[10]

[9]Obviously, one may define Δ_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. Unfortunately, the results will not remain unaffected by this arbitrary choice; cf. OAXACA (1973).

[10]Once again, one may define Δ_t^{unex} differently and interchange east and west. This arbitrary

The conditional mean $E(y_{it}|x_{it}, \beta_t^{west})$ is estimated as $\Phi(x'_{it}\hat{\beta}_t^{west})$, whereas the coefficients' estimate $\hat{\beta}_t^{west}$ is obtained from a probit[11] regression using the relevant sub-sample. Analogously, this applies to $E(y_{it}|x_{it}, \beta_t^{east})$. Estimates for the expectations unconditional on x, i.e. $E_x\left[E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{west}, t\right]$, are derived through taking weighted sample means of $\Phi(x'_{it}\hat{\beta}_t^{west})$, once again using the relevant sub-sample. This analogously applies to $E_x\left[E(y_{it}|x_{it}, \beta_t^{east})|i \in I^{east}, t\right]$ as well as $E_x\left[E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{east}, t\right]$ and $E_x\left[E(y_{it}|x_{it}, \beta_t^{east})|i \in I^{west}, t\right]$, whereas counterfactual probabilities are used for the latter ones. That is, we use estimates $\hat{\beta}$ that are obtained from the antithetic sub-sample to the one that is used for calculating the sample mean.

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 Δ_t, Δ_t^{expl}, and Δ_t^{unex}:

$$\Delta_t \equiv \log E_x\left[E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{west}, t\right] - \log E_x\left[E(y_{it}|x_{it}, \beta_t^{east})|i \in I^{east}, t\right] \quad (2)$$

$$\Delta_t^{expl} \equiv \log E_x\left[E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{west}, t\right] - \log E_x\left[E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{east}, t\right] \quad (3)$$

$$\Delta_t^{unex} \equiv \log E_x\left[E(y_{it}|x_{it}, \beta_t^{west})|i \in I^{east}, t\right] - \log E_x\left[E(y_{it}|x_{it}, \beta_t^{east})|i \in I^{east}, t\right] \quad (4)$$

Equation (1) still applies. Ultimately, our focus is on the changes in the unex-

choice will lead to different results. We therefore report results for either variant.

[11] Decomposition results just marginally change if a logit- or a complementary log-log model is used instead.

plained 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 Δ_t^{unex} as statistically significant, standard errors are required. Unfortunately, standard errors are rarely reported for the Blinder-Oaxaca decomposition, cf. 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.[12]

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 being married, 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

[12]Duplication factors need to be integers, yet sampling weights take non-integer values. This results in a small rounding error.

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 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.

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 sub-samples; 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 sub-samples. In the second, the full model is not estimated separately for all eight cells, but sub-samples 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 drug 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 $(\alpha_t^{west} - \alpha_t^{east})$.[13] In fact, in the linear – but not the non-linear – case the unexplained component Δ_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 $\widehat{\alpha}$ 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.[14]

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 sub-samples, all these vari-

[13] Technically, this difference is estimated as a single coefficient attached to one regional dummy.

[14] 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 constat term α is estimated for any of the eight sub-samples defined by region and time, yet all other coefficients β are not allowed to vary across sub-samples.

Table 4: **Probit-regression pooled by region**

variable	Year 1990		Year 1995		Year 1997		Year 2000	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
east	-0.776**	0.171	-0.569**	0.158	-0.426**	0.178	-0.342**	0.110
female	-0.261**	0.050	-0.507**	0.098	-0.299**	0.103	-0.340**	0.073
age	0.013	0.060	0.058	0.089	0.061	0.099	-0.141**	0.069
age^2/100	-0.090	0.110	-0.179	0.154	-0.134	0.162	0.190	0.117
married	-0.402**	0.098	-0.602**	0.127	-0.507**	0.187	-0.379**	0.129
living with partner	-0.142	0.093	0.099	0.124	-0.230	0.146	-0.085	0.120
living with parents	-0.165*	0.096	0.101	0.137	-0.050	0.144	-0.184	0.127
living with somebody else	0.066	0.092	0.366**	0.122	-0.089	0.162	0.024	0.115
number of children	-0.081	0.058	-0.122*	0.064	-0.033	0.090	-0.114*	0.066
pupil	0.209*	0.117	0.448*	0.270	0.296	0.263	0.428**	0.153
student	-0.101	0.097	0.065	0.199	0.481**	0.206	0.249*	0.137
apprentice	0.005	0.081	0.110	0.213	0.398**	0.195	0.247*	0.147
employed full-time	-0.042	0.080	-0.107	0.169	0.181	0.158	-0.139	0.123
employed part-time	0.140	0.112	0.258	0.222	0.132	0.196	-0.049	0.159
employed marginally	0.174	0.119	0.106	0.272	0.111	0.195	0.359**	0.124
jobless	0.408**	0.127	0.083	0.220	0.632**	0.210	0.100	0.179
number of months unemployed	0.020**	0.004	0.021**	0.006	0.004	0.006	0.022**	0.005
blue collar	0.068	0.076	0.404**	0.153	0.180	0.195	0.189	0.116
white collar	-0.092	0.082	0.256*	0.155	0.158	0.168	0.083	0.113
self-employed	0.269**	0.127	0.780**	0.186	0.598**	0.207	0.221	0.162
low degree of schooling	-0.075	0.176	0.117	0.195	-0.564**	0.232	-0.121	0.223
intermediate degree of schooling	-0.017	0.178	0.252	0.193	-0.274	0.221	0.077	0.199
high degree of schooling	0.136	0.183	0.194	0.214	-0.135	0.234	0.189	0.206
university degree	-0.170	0.212	0.369	0.230	-0.286	0.244	0.077	0.224
income 1000 DM to 1500 DM	-0.075	0.122	0.221	0.168	-0.079	0.199	0.017	0.144
income 1500 DM to 2000 DM	0.145	0.119	-0.107	0.177	-0.228	0.213	0.199	0.160
income 2000 DM to 2500 DM	-0.056	0.120	-0.367**	0.179	-0.327*	0.194	0.107	0.156
income 2500 DM to 3000 DM	0.041	0.122	-0.457**	0.187	-0.362*	0.207	0.182	0.156
income 3000 DM to 4000 DM	-0.045	0.121	-0.260	0.179	-0.189	0.197	0.011	0.147
income 4000 DM to 5000 DM	-0.140	0.126	-0.082	0.180	-0.380*	0.206	0.041	0.162
income 5000 DM to 6000 DM	0.058	0.134	0.041	0.207	-0.478*	0.250	0.245	0.163
income more than 6000 DM	0.171	0.125	-0.322	0.203	-0.139	0.227	-0.003	0.155
city/town pop. 2 to 5 thousand	-0.072	0.107	0.007	0.311	0.314	0.259	0.531**	0.195
city/town pop. 5 to 20 thousand	0.037	0.091	0.225	0.255	0.208	0.228	0.451**	0.180
city/town pop. 20 to 50 thousand	0.028	0.097	0.149	0.265	0.413*	0.240	0.382**	0.176
city/town pop. 50 to 100 thousand	0.194*	0.105	0.413	0.268	0.126	0.259	0.703**	0.252
city/town pop. 100 to 500 thousand	0.132	0.097	0.486*	0.251	0.372	0.241	0.467**	0.189
city/town pop. more than 500 thousand	0.309**	0.097	0.731**	0.249	0.536**	0.237	0.519**	0.174
constant	-1.175	0.805	-2.027	1.325	-1.935	1.523	0.711	0.973
number of observations	13 400		3 584		3 682		3 318	
log-likelihood	-2 008.6		-750.4		-783.0		-883.3	
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.

ables 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 sub-samples. 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 $\widehat{\beta}_t^{east}$ 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 sub-sample and the full set of right-hand-side variables, estimated standard errors are still very large. This may be explained by the small number of consumers of illicit drugs observed in East-Germany. Age together with age squared and months unemployed turn out to be the only regressors or group of regressors that are (jointly) clearly significant. A few others, in particular "living arrangements", "current educational arrangements", "gender" and "marital status", just sail at the margin of statistical significance. In contrast, any variable or group of variables is highly significant for the pooled West-German sample. Therefore, pooling over periods still presents the problem that any decomposition result critically depends on estimates $\widehat{\beta}^{east}$ that are barely reliable.

In order to capture the unexplained part of west-east deviations in the prevalence of substance abuse using a measure that is more reliably estimated than $(\widehat{\beta}_t^{west} - \widehat{\beta}_t^{east})$, 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 4. Moreover, almost all regressors or groups of regressors, respectively are clearly significant in at least two out of four regressions. Gender, marital status, months unemployed, and living in a large city are even significant in any regression. 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 consumption levels and cannot be related to regionally differing patterns of association of substance abuse with socioeconomic characteristics.[15]

4 Decomposition Results

In this section, we present decomposition results that are based on the preferred specification for which estimation results are reported in the previous section; see Table 4. Table 5 displays estimates for the mean difference in log-conditional means Δ_t as well as its components Δ_t^{expl} and Δ_t^{unex}.

[15] All three variants of the model, i.e. (i) separate regressions for all eight sub-samples 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 sub-samples 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.

For the latter two variants are displayed, one with West-Germany serving as reference category, i.e. $\log E_x \left[E(y_{it}|x_{it}, \beta_t^{west}) | i \in I^{east}, t \right]$ is used as counterfactual log-mean, and another variant where the reference region is reversed, i.e. $\log E_x \left[E(y_{it}|x_{it}, \beta_t^{east}) | i \in I^{west}, t \right]$ enters the decomposition-formula. Both variants do just marginally differ. This does not come as a surprise. Due to pooling across regions, Δ_t^{unex} rests on the deviation of constants α_t^{west} and α_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 confirmed by one-sided tests. The dominance of the unexplained component is further underpinned by the result that $\widehat{\Delta}_t^{unex}$ 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 $\widehat{\Delta}_t^{expl}$. 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

Table 5: **West-East decomposition of the prevalence of illicit drugs**

Year	Δ_t	Δ_t^{expl}	Δ_t^{unex}	Δ_t^{expl}	Δ_t^{unex}
		Ref. Region West		Ref. Region East	
1990	1.925**	0.216**	1.709**	0.278*	1.647**
	(0.303)	(0.109)	(0.322)	(0.143)	(0.323)
1995	1.027**	0.129	0.898**	0.156	0.871**
	(0.225)	(0.101)	(0.216)	(0.129)	(0.215)
1997	1.011**	0.217**	0.794**	0.291**	0.721**
	(0.210)	(0.094)	(0.223)	(0.106)	(0.208)
2000	0.375**	-0.142*	0.518**	-0.148*	0.524**
	(0.143)	(0.073)	(0.156)	(0.086)	(0.164)
joint significance†	0.000	0.006	0.000	0.003	0.000

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

higher prevalence rates in West-Germany. This may be taken as a west-east difference in culture, whereas West-Germans seem to have more of an affinity for illicit drugs 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 6. For any transition, the west-east difference in log-mean conditional prevalence rates decreases, as is the case for the empirical difference in logs, cf. Table 2. Jointly, the changes in Δ_t as well as the changes in its components Δ_t^{expl} and Δ_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 Δ_t is dominated by its unexplained part.

Table 6: **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	-0.898**	-0.087	-0.812**	-0.122	-0.777**
	(0.377)	(0.149)	(0.388)	(0.193)	(0.388)
1995 to 1997	-0.016	0.088	-0.104	0.135	-0.150
	(0.308)	(0.138)	(0.311)	(0.167)	(0.299)
1997 to 2000	-0.636**	-0.360**	-0.276	-0.439**	-0.197
	(0.254)	(0.119)	(0.273)	(0.136)	(0.265)
joint sig.†	0.000	0.005	0.010	0.004	0.019

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

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 change in Δ_t is very small and statistically insignificant. This also applies to its components. Finally both, the explained and the unexplained component, seem to contribute to the distinct decrease of Δ_t from 1997 to 2000. Yet, in absolute terms the change in the explained part exceeds the change in the unexplained one. Moreover, only the the former significantly differs from zero.

In order to quantify to contribution of socioeconomic factors and culture to the overall convergence during the 1990s, we directly compare the years 2000 and 1990, see Table 7. Though both, the explained and the unexplained component contribute significantly, the unexplained part accounts for roughly three-fourths in the overall

Table 7: **Overall changes in decomposition-components in the 1990s**

$(\Delta_{2000} - \Delta_{1990})$	$(\Delta^{expl}_{2000} - \Delta^{expl}_{1990})$	$(\Delta^{unex}_{2000} - \Delta^{unex}_{1990})$	$(\Delta^{expl}_{2000} - \Delta^{expl}_{1990})$	$(\Delta^{unex}_{2000} - \Delta^{unex}_{1990})$
	Ref. Region West		Ref. Region East	
absolute changes				
-1.550**	-0.358**	-1.192**	-0.426**	-1.124**
(0.335)	(0.132)	(0.358)	(0.167)	(0.362)
shares in total change				
1.000	0.231**	0.769**	0.275**	0.725**
–	(0.098)	(0.098)	(0.119)	(0.119)

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

convergence in log-mean conditional prevalence rates.[16] I.e. the process of convergence remains largely unexplained.

In sum, the prevalence of illicit drugs 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 substance abuse. Yet one caveat remains: no reliable measure for the local supply of illicit drugs or the local price of drugs is available to us. So, we cannot validate this result by controlling for the local supply and the local price of illicit psychoactive substances.

[16]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 sub-samples but uses a very small set of regressors.

5 Conclusions

Since the reunification of Germany in 1990 an intense debate has been going 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 substance abuse. It has been shown that prevalence rates of illicit drugs have, in fact, converged in West- and East-Germany. More importantly, decomposition results suggest that this convergence can just weakly be related to socioeconomic characteristics. It therefore represents first of all a cultural phenomenon. That is, at least with respect to substance abuse, West- and East-Germans did become more similar per se during the 1990s.

Convergence in drug consumption that goes along with an increase of prevalence rates seems to be a rather undesirable manifestation of cultural convergence at most. Moreover, convergence in substance abuse 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 going on 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. & M. SINNING (2008): An Extension of the Blinder-Oaxaca Decomposition to Non-Linear Models, *AStA - Advances in Statistical Analysis*, published online DOI: 10.1007/s10182-008-0056-3. http://www.springerlink.com/content/30851056563v1lht/fulltext.pdf.

BLINDER, A.S. (1973): Wage Discrimination: Reduced Form Estimates, *Journal of Human Resources* 8(4), 436-455. http://www.jstor.org/view/0022166x/ap010031/01a00040/0.

BURDA, M.C. & CH.M. SCHMIDT (1997): Getting behind the East-West Wage Differential – Theory and Evidence. In: R. Pohl & H. Schneider (eds.): Wandeln oder weichen – Herausforderungen der wirtschaftlichen Integration für Deutschland, 170-201. IWH-Halle. http://www.iwh-halle.de/d/publik/sh/SH%203%2097.htm

CSÉMY, L., L. KUBIČKA & A. NOCIAR (2002): Drug Scene in the Czech Republic and Slovakia during the Period of Transformation, *European Addiction Research* 8(4), 159-165. http://content.karger.com/ProdukteDB/produkte.asp?Aktion=ShowPDF&ArtikelNr=66134&Ausgabe=228714&ProduktNr=224233&filename=66134.pdf

DESIMONE, J. & M. FARRELLY (2003): Price and Enforcement Effects on Cocaine and Marijuana Demand, *Economic Inquiry* 41(1), 98-115. http://

www.blackwell-synergy.com/doi/abs/10.1093/ei/41.1.98.

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. http://www.jstor.org/view/0734306x/di015202/01p0006g/0?frame=noframe&userID=c25ef720@rwi-essen.de/01c0a8487300509c6c6&dp3&config=jstor.

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. http://iospress.metapress.com/index/E1GQMW31W5D4ENKA.pdf.

HÜSLER, G., E. WERLEN & B. PLANCHEREL (2004): Der Einfluss psychosozialer Faktoren auf den Cannabiskonsum, *Suchtmed* 6(3), 221-235. http://www.ecomed-medizin.de/sj/sfp/Pdf/aId/6825.

JANN, B. (2005): Standard Errors for the Blinder-Oaxaca Decomposition, German Stata Users' Group Meetings 2005 03, Stata Users Group. http://repec.org/dsug2005/oaxaca_se_handout.pdf.

KRAUS, L. & R. AUGUSTIN (2001): Population Survey on the Consumption of Pychoactive Substances in the German Adult Population 2000, *Sucht - Zeitschrift für Wissenschaft und Praxis* 47, Sonderheft 1, 1-88. http://www.neuland.com/index.php?s=sxt&s2=inh&s3=2001701.

LAGERSPETZ, M. & J. MOSKALEWICZ (2002): Drugs in the Postsocialist Transitions of Estonia, Latvia, Lithuania and Poland, *European Addiction Research* 8(4), 177-183. http://content.karger.com/ProdukteDB/produkte.asp?Aktion=ShowPDF&ArtikelNr=66137&Ausgabe=228714&ProduktNr=224233&filename=66137.pdf.

OAXACA, R.L. (1973): Male-Female Wage Differentials in Urban Labor Markets, *International Economic Review* 14(3), 693-709. http://www.jstor.org/view/00206598/di008315/00p0126i/0

PERKONIGG, A., R. LIEB & 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. http://content.karger.com/ProdukteDB/produkte.asp?Aktion=ShowPDF&ArtikelNr=18920&Ausgabe=225626&ProduktNr=224233&filename=18920.pdf.

PUDNEY, S. (2004): Keeping off the Grass? An Econometric Model of Cannabis Consumption in Britain, *Journal of Applied Econometrics* 19(4), 435-453. http://www3.interscience.wiley.com/cgi-bin/abstract/108564457/ABSTRACT

REIßIG, M. (1991): Jugend und Suchtmittel. In: W. Friedrich & H. Griese (eds.): Jugend und Jugendforschung in der DDR, 201-209. Opladen: Leske & Budrich.

SAFFER, H. & F. CHALOUPKA (1999): The Demand for Illicit Drugs, *Economic In-*

quiry 37(3), 401-411. http://www.blackwell-synergy.com/doi/abs/10.1111/j.1465-7295.1999.tb01439.x.

TYLOR, E.B. (1903): Primitive Culture: Researches into the Development of Mythology, Philosophy, Religion, Language, Art, and Custom. London: Murphy.

VAN OURS, J.C. & J. WILLIAMS (2007): Cannabis Prices and Dynamics of Cannabis Use, *Journal of Health Economics* 26(3), 578-596. http://www.sciencedirect.com/science/article/B6V8K-4MBBYJC-2/2/9636fe5fe87922b999444831d9ef2

Skip to content. Skip to navigation

- Home
- Legal
- Contact & Suggestions
- Alerting Service

Search Site

Search Go!

Advanced Search

Advanced Search…

Sections

- Login as:
- Author
- Associate Editor
- Registered Reader

Register now

- economics
  - Journal Articles
  - Discussion Papers
- Special Areas
  - Surveys and Overviews
  - Policy Papers
  - New Frontiers Papers
  - Special Issues
- Submission
  - Submit Paper
  - Guidelines for

Log in as Registered Reader

To take part in the open assessment of discussion papers and articles (i.e., to upload comments and rate published papers), you need to be registered. To register you will need to provide your name, institution, academic status, and CV. This information is meant to ensure that only qualified readers can submit comments or rate papers.

As a registered reader you have the opportunity to advertise your own research, for example, by referring to your own

Announcements

Special Issue: Discounting the Long-Run Future and Sustainable Development
Editor: Phoebe Koundouri

Eric Maskin Co-Winner of the 2007 Nobel Prize

Special Issue: Using Econometrics for Assessing Economic

- Authors
- Conception
  - economics at a Glance
  - Aims and Scope
  - Review Process
  - Prizes
  - License Agreements
- Community
  - Editorial Board
  - Advisory Board
  - Associate Editors
  - Authors
  - Registered Readers
- Sponsors & Partners
  - BASF
  - O2
  - E.ON
  - Financial Times Deutschland
  - DFG
  - ZBW

related papers in your comment on a published paper or by uploading related papers to be included in the list "Related Links" that accompanies every article and every discussion paper published on this Web site. Moreover, you may display a link to your own Web site if you so wish.

If you do not have an account here, head over to the registration form.

Account details
Login Name
Login names are case sensitive, make sure the caps lock key is not enabled.

Password
Case sensitive, make sure caps lock is not enabled.
If you have forgotten your password, click here to retrieve it.

☐ Remember my name.
Check this to have your user name filled in automatically when you log in later.

Log in

Please log out or exit your browser when you're done.

Models Editor: Katarina Juselius
More announcements…

Advisory Board

- George A. Akerlof
- Gary S. Becker
- Jagdish N. Bhagwati
- Willem H. Buiter
- Lawrence Christiano
- Alan Deardorff
- Avinash Dixit
- Robert Feenstra
- Richard B. Freeman
- James J. Heckman
- Edward Leamer
- Assar Lindbeck
- Eric Maskin
- Robert Mundell
- Maurice Obstfeld
- Amartya Sen
- A. Michael Spence
- Guido Tabellini
- Jeffrey G. Williamson