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Local Autonomy, Tax Morale and the Shadow Economy

Benno Torgler^{*}, Friedrich Schneider^{**} and Christoph A. Schaltegger^{***}

Abstract Policymakers often propose strict enforcement strategies to fight the shadow economy and to increase tax morale. However, there is an alternative bottom-up approach that decentralizes political power to those who are close to the problems. This paper analyses the relationship with local autonomy. We use data on tax morale at the individual level and macro data on the size of the shadow economy to analyse the relevance of local autonomy and compliance in Switzerland. The findings suggest that there is a positive (negative) relationship between local autonomy and tax morale (size of the shadow economy).

Keywords Tax Morale · Shadow Economy · Tax Compliance · Tax Evasion · Local Autonomy · Federalism · Institution

JEL Classification H260 · H730 · D700

* B. Torgler.

The School of Economics and Finance, Queensland University of Technology, GPO Box 2434, Brisbane, QLD 4001, Australia,
e-mail: benno.torgler@qut.edu.au

** F. Schneider.

Department of Economics, Johannes Kepler University of Linz, A-4040 Linz-Auhof, Austria.
e-mail: friedrich.schneider@jku.at,
<http://www.econ.jku.at/Schneider>.

*** C. A. Schaltegger

economiesuisse, Hegibachstrasse 47, CH-8032 Zurich, University of St. Gallen.
e-mail: christoph.schaltegger@economiesuisse.ch.

All are research fellows of CREMA – Center for Research in Economics, Management and the Arts, Switzerland. Torgler and Schneider are also associated with CESifo.

1 Introduction

Why do people pay taxes? This question has attracted increased attention in the tax compliance literature over the last few years. It can be supposed that nobody likes to pay taxes. One possibility is to “force” people to pay their taxes by establishing a deterrence policy. In line with the economics-of-crime approach based on the expected utility maximisation calculus, Allingham and Sandmo (1972) presented a formal model showing that the extent of tax evasion is negatively correlated with the probability of detection and the degree of punishment. However, this seminal model has since been criticised by many authors (see, e.g., Graetz and Wilde 1985; Alm, McClelland and Schulze 1992; Frey and Feld 2002). A great deal of dispute surrounds the empirical and experimental findings, as these deterrence models predict a comparatively high incidence of tax evasion. In many countries the actual level of deterrence is too low to explain the high degree of tax compliance. Furthermore, there is a considerable gap between the amount of risk aversion that is required to guarantee such compliance and the effectively reported degree of risk aversion. For the United States, the estimated Arrow-Pratt measure of risk aversion is between one and two, but only a value of 30 would explain the observed compliance rate (see Graetz and Wilde 1985, Alm, McClelland and Schulze 1992). Similarly, in Switzerland the relative risk aversion varies between 1 and 2, but a value of 30.75 would be necessary to reach the observed level of tax compliance of 76.52 % (see Frey and Feld 2002). Furthermore, tax compliance experiments mostly report a higher level of income declaration than the expected utility model would predict (for a survey see Torgler 2002).

To resolve this puzzle of tax compliance, many researchers have argued that tax morale¹ can help explain the high degree of tax compliance (for empirical and experimental

¹ First important findings in the tax morale literature date from the 1960s and 1970s by German scholars around Günter Schmolders (1951/1952, 1960, 1962, 1970) known as the ‘Cologne school of tax psychology’. They have emphasised that economic phenomena should not be analysed only from the traditional point of view. They saw tax morale as an attitude regarding tax (non-) compliance (see, e.g., Schmolders 1960).

papers see, e.g., Schwartz and Orleans 1967; Lewis 1982; Roth, Scholz and Witte 1989; Alm, McClelland and Schulze, 1992, 1999; Pommerehne, Hart and Frey 1994; Frey 1997; Frey and Feld 2002; Feld and Tyran 2002; for a survey see Torgler 2001). A theoretical approach by Erard and Feinstein (1994) demonstrates the relevance of integrating moral sentiments into the models to provide a reasonable explanation of actual compliance behaviour. Moreover, in their overview paper on tax compliance, Andreoni, Erard and Feinstein (1998) point out that “adding moral and social dynamics to models of tax compliance is as yet a largely undeveloped area of research” (1998: 852). Many researchers find that a considerable portion of taxpayers are always honest. Some taxpayers are “simply predisposed not to evade” (Long and Swingen 1991: 130) and thus do not even search for ways to cheat at taxes (see Frey 1999). Increasing numbers of papers go beyond treating tax morale as a black box, a residuum, and analyse which factors shape or maintain tax morale (for an overview see Torgler 2007). In addition, policymakers have become interested in understanding the driving forces of tax morale and the possibility that it influences willingness to pay taxes.

In the first part of the paper, we use Swiss data to investigate whether there is a relationship between decentralized political competencies and the willingness to comply. Thus, we evaluate whether local autonomy is correlated with tax morale (controlling for other factors). For this first section, we investigate a cross-section of individuals throughout Switzerland using the International Social Survey Programme (ISSP) data set “Religion II”. The second part of the paper explores the same question but uses the size of the shadow economy instead of tax morale as the dependent variable. Use of this variable addresses a relevant issue: whether results obtained on tax morale are also reflected in real, or observed, behaviors. To this end, we complement the attitudinal level investigation of tax morale with a more output-oriented variable, namely the shadow economy. Further, it is possible that the size of the underground economy can serve as a useful, if somewhat imperfect, measure of the extent of tax evasion (Alm, Martinez-Vazquez, and Schneider, 2004). Thus, in the second part

of the paper we will investigate the extent to which local autonomy affects the size of the shadow economy. This second section also uses Swiss data to complement the micro approach with a macro approach at the cantonal level. It is essential to determine under which conditions it is more likely that citizens pay their taxes. Switzerland has been selected as the subject of our analysis because it allows observation of the influence of institutional factors, because cantons have different degrees of fiscal decentralization.

Interestingly, the link between local autonomy and tax morale, tax compliance or the size of the shadow economy has been disregarded in the literature. Most of the papers using Swiss data focus on direct democracy. Estimating a cross section/time series multiple regression Pommerehne and Weck-Hannemann (1996) found that in cantons with a high degree of direct political control, tax evasion is – *ceteris paribus* – about SFr 1500 lower compared to the average of the cantons without such direct influence. Feld and Frey (2002b) analysed how tax authorities treat taxpayers in Switzerland and found that tax authorities of cantons with more direct participation rights, compared to cantons with less direct democracy, treat taxpayers more respectfully and are less suspicious if taxpayers report incomes that seem too low. On the other hand, non-submission of tax declarations is more heavily fined. Looking at the experimental evidence, Alm, McClelland and Schulze (1999); Feld and Tyran (2002); Torgler and Schaltegger (2005); and Torgler, Schaltegger and Schaffner (2003) found that voting on tax issues has a positive effect on tax compliance. The experiments were conducted in the United States, Latin America and Switzerland. Torgler (2005) also shows a positive effect of voting on tax morale using Swiss data. Tyler's research (1990a, 1990b, 1997) also provides support for the importance of legitimacy and allegiance to authority in compliance decisions. Alm, Jackson and McKee (1993) analyze the effects of fiscal institutions on compliance by varying the process by which tax collection becomes a public good (voting versus imposition). Donations given to a campus organization were taken as public good. So, the public good was not distributed directly to the subjects, but sent to a specific organization.

The experimental results provide evidence that tax compliance is higher when individuals can vote on the use of their taxes than when there is no voting over alternatives. Individuals are more likely to comply with the requirement to pay their taxes when they are able to select the public sector expenditure program. On the other hand, tax compliance is lower when subjects cannot control the use of their tax payments. Thus, the way people are treated by the authorities affects their evaluation of these authorities and their willingness to co-operate (see, e.g., Tyler, Casper and Fisher 1989). Working with the World Values Survey, Torgler and Schneider (2007a) also explore the relevance of culture in three multicultural European countries, namely Belgium, Spain and Switzerland. Other studies such as Torgler and Schneider (2007b) or Friedman et al. (2000) explore the importance of institutional quality at the international level. Using more than 25 proxies to measure governance and institutional quality, Torgler and Schneider (2007b) find strong support that the quality of institutions is related to a smaller shadow economy. However, they disregarded the analysis of decentralization and local autonomy.

Section 2 presents theoretical considerations focusing on local autonomy. Section 3 and 4 present the empirical findings and Section 5 finishes with some concluding remarks.

2 Decentralization

The literature on fiscal federalism pioneered by Oates's (1972) work on the advantages of a decentralized provision of publicly provided goods has discussed the pros and cons of decentralisation at length (for a survey, see Oates, 2008). In short, the main advantages of decentralization are seen in public goods that are better tailored to the needs of the voters (Oates, 1972), in endogenous restrictions to a Leviathan-behaving government (Lockwood, 2006) and in incentives for political innovations (Rose-Ackerman, 1980). On the other hand, disadvantages of decentralisation are seen in various kinds of distortions: namely urban

externalities, fiscal externalities (vertically and horizontally) and local protection that may result in a race to the bottom with taxes and consequently an underprovision of public goods (see Oates, 1999 for a survey).

The advantage of smaller structures in tax policy is that citizens' preferences are able to be better served than in a framework where a uniform tax system is designed for a population with heterogeneous preferences. Moreover, there is an intensive everyday interaction between taxpayers and local politicians and bureaucrats. This closeness between taxpayers, the tax administration and the local government may induce trust and thus enhance tax morale. Politicians and members of the administration are better informed about the preferences of the local population. Furthermore, there is a politico-institutional aspect: if politicians are elected at the local level, they have an incentive to take the preferences of their constituency into account and thus to spend the local tax revenues according to local preferences (see Frey and Eichenberger 1999). Decentralisation brings the government closer to the people. Many economists point out the relevance of giving sub-national governments the taxing power (see, e.g., Bahl 1999). One of the strengths of a decentralised system is greater transparency between the tax price and the public services received. Taxes are comparable to prices in some sense, especially at the local level (Blankart, 2002). Even the (progressive) income tax is a good instrument for a local structure. It is always under individuals' test, providing citizens the opportunity to use the instruments of exit and voice (see Hirschman 1970). The mechanism of fiscally induced migration in federal states provides a strong incentive to provide public services in accordance to taxpayers' preferences. Moreover federalism and local autonomy is connected to innovation. Federalism serves as a laboratory for policy inventions (Oates 1999). In the words of U.S. Supreme Court Justice, Louis Brandeis in 1932: "It is one of the happy incidents of the federal system that a single courageous State may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country" (Oates 1999, p. 1132). Feld and

Schnellenbach (2004) have analysed different policy fields at the Swiss local level, where this kind of laboratory federalism in fact served as a breeding ground for innovations. If voters can compare the performance of their government with the performance of neighbouring governments with similar conditions, there is also some kind of yardstick competition.² Thus, this leads to the following hypothesis:

Hypothesis 1: The more extensive the local autonomy, the higher ceteris paribus tax morale and the lower the size of the shadow economy³.

3 Empirical results on tax morale

3.1. Model

In order to examine our hypotheses derived in section 2, the following estimation equation is postulated for tax morale⁴:

$$TM_i = \beta_0 + \beta_1 \cdot LA_c + \beta_2 \cdot DD_c + \beta_3 \cdot D_c + \beta_4 \cdot T_i + \beta_5 \cdot Y_i + \beta_6 \cdot CTL_i + \beta_7 \cdot TR_i + \varepsilon_i$$

where TM_i denotes the individual degree of tax morale. The general question to assess the level of tax morale from the ISSP (year 1999) was:

Do you feel it is wrong or not wrong if a taxpayer does not report all of his or her income in order to pay less income taxes? (1= not wrong, 2= a bit wrong, 3= wrong, 4=seriously wrong).

² The seminal contribution on yardstick competition stems from Besley and Case (1995).

³ However, it should be noticed that in Switzerland local authorities administer the largest part of income taxpayers. The cantonal level, which is the focus in this paper, copes only with a smaller share of taxpayers directly.

⁴ See Appendix Table A1 and A2 for the description and the summary statistics of the variables.

The measurement of tax morale is not free of bias. First, because the available data are based on self-reports in which subjects may tend to overstate their degree of compliance (Andreoni, Erard, and Feinstein 1998), no objective or directly observable measure of tax morale is available. Moreover, Elffers, Weigel, and Hessing (1987) found strong differences between actual evasion assessed and evasion reported in survey responses. Nonetheless, because the way we define tax morale is less sensitive than asking whether a person has evaded taxes, we expect the degree of honesty to be higher. Moreover, the dataset is based on wide-ranging surveys, which reduces the probability of respondent suspicion and the framing effects of other tax context questions. It can still be argued, however, that a taxpayer who has evaded in the past will tend to excuse this kind of behavior and report a higher tax morale in the survey.

In general, the use of such a single question has the advantage of reducing problems of index construction complexity, especially in regard to measurement procedure or low correlation between items. Nonetheless, it can also be argued that tax morale is a multidimensional concept that requires a multi-item measurement tool and the likelihood of a multi-item index being adversely affected by random errors will produce more reliable measures. However, several previous studies have found consistent results using single-item survey measurements and laboratory experiments (e.g., Cummings et al., 2009; Alm and Torgler 2006).

Our key independent variable is local autonomy (LA_c). Local autonomy is measured at the cantonal level (c) with an index developed by Ladner (1994) based on survey results where chief local administrators in 1865 Swiss municipalities were asked to report how they perceive their local autonomy on a 10 point scale. (1= no autonomy, 10 = very high communal autonomy).

The other independent variables are specified as follows:

1. DD_c : For the degree of direct democracy the six-point scale index developed by Stutzer (1999) and applied, e.g., by Frey and Stutzer (2000, 2002); Frey and Feld (2002); Feld and Frey (2002a, 2002b) has been used. The index reflects the extent of direct democratic participation (1= lowest and 6 highest degree of participation) at the cantonal level.⁵ As indexes do not reveal as much as a single instrument, we are going to measure the degree of direct democratic participation with a dummy on legislative referendum and degree of signature requirements for legislative initiatives. Previous papers have stressed that direct democracy has an impact on tax morale and enhances taxpayers' sense of civic duty (Feld and Frey 2002a, Torgler 2005, Alm, Jackson and McKee 1993)
2. T_i : Individual tax rate and Y_i : The individuals' household income (see Appendix Table A1). These are common factors used in a tax compliance model (see Alm 1999, Torgler 2002, 2007).
3. TR_i : measures using the ISSP data set the confidence in the courts and the legal system⁶. In general, it can be argued that positive actions by the state are intended to increase taxpayers' positive attitudes and commitment to the tax system and tax-payment and thus compliant behaviour (e.g., Smith 1992; Smith and Stalans 1991). One may raise the criticism that cantons with more local autonomy and direct democracy have better governments and therefore people are more willing to pay their taxes in a state that works better. This would, for example, suggest that an improvement in tax morale is independent of whether a particular citizen has the opportunity to vote. Thus, to isolate the relationship between institutions and tax

⁵ The index includes the four legal instruments: the popular initiative to change the canton's constitution, the popular initiative to change the canton's law, the compulsory and optional referendum to prevent new law or changing of a law and the compulsory and optional referendum to prevent new state expenditure. The index is based on the degree of restrictions in form of the necessary signatures necessary for using an instrument, the time span to collect the signatures and the level of new expenditure which requires use of the financial referendum (for a detailed discussion see Stutzer, 1999).

morale it is important to control for institutional trust. Alternatively, one could also try to include a dummy for “foreigners”, as they are not involved in the voting process. Unfortunately, this information is not provided by the ISSP data set.

4. D_i : measures deterrence focusing on the audit probability by approximating the number of tax auditors per taxpayer (in ‰) in each canton c and the penalty tax rate approximated by the standard legal fine as a multiple of the evaded tax amount (in percent) in a canton c . It is difficult to predict the effects of deterrence factors on *tax morale*. We are therefore including this variable sequentially in the specification. Deterrence imposed by the tax authority might crowd out taxpayers’ intrinsic motivation to pay their taxes and thus crowd out tax morale. On the other hand, deterrence factors might prevent taxpayers with a low tax morale exploiting the more honest taxpayers. Tax morale is therefore not expected to be crowded out if the honest taxpayers perceive the stricter policy to be directed against dishonest taxpayers. The economics-of-crime approach may be more reliable when focusing on the shadow economy. The model would predict that the extent of the *shadow economy* depends negatively on the probability of being caught and the size of punishment in case of being caught.⁷
5. CTL_i : further control variables (age, gender, education, marital and employment status and religiosity). As a robustness test we are also going to control for cultural differences. Such control variables have been used in the past and report a positive correlation for age, gender, and religiosity, and being married, a negative for self-employment and mixed results for the variable education (Torgler 2006, 2007).

3.2. Results

⁶ How much confidence do you have in courts and the legal system (5=complete confidence to 1=no confidence at all).

We present weighted ordered probit models. Some groups might be over-sampled. A weighted variable helps to correct the samples and thus to reflect national distribution. The weighted ordered probit models help analyse the ranking information of the scaled dependent variable tax morale. As in the ordered probit estimation, the equation has a non-linear form; only the sign of the coefficient can be directly interpreted and not its size. Calculating the marginal effects is therefore a method of determining the quantitative effect a variable has on tax morale. The marginal effect indicates the change in the share of taxpayers (or the probability of) belonging to a specific tax morale level, when the independent variable increases by one unit. In the weighted ordered probit estimation, only the marginal effects for the highest value “seriously wrong not to report all the income” (ISSP 1998) are shown.

We report clustering-robust standard errors (or t-statistics) for all tax morale regressions as we combine data on tax morale at the individual level with institutional data at the cantonal level. If the random errors are correlated at the cantonal level, the standard errors of the coefficient on the institutional variables are underestimated. Moulton (1990) has shown that failing to take this correlation into account would lead to a serious downward bias in the estimated errors, resulting therefore in inflated t-statistics and perhaps spurious finding of statistical significance for the institutional variable.

The results of 12 regressions are presented in Table 1 to 3. First we explore in Table 1 only LOCAL AUTONOMY (LA) as an institutional variable, including in (2) T (tax rate), and in (3) TR (institutional trust). In a second step, we add in Table 2 DD (direct democracy) (4) and D, the two deterrence factors (5). In equation (6) we also test the robustness of model using an OLS instead of an ordered probit model. In this case we report *beta* or *standardized* regression coefficients to explore the relative importance of local autonomy. In Table 3 we conduct a further robustness test. We control for cultural differences using a language dummy LATIN (French and Italian speaking individuals) while running all of the previous

⁷ Young, Reksulak and Shughart (2001) find a great deal of geographic variation in the tax compliance efforts of

regressions. Torgler and Schneider (2007a) have shown the importance of controlling for culture differences within a country.

As can be seen, there is a strong and positive correlation between LA and TM (tax morale). The coefficient is always statistically significant and the marginal effects indicate that an increase in LA by one point raises the share of persons indicating the highest TM value by more than three percentage points. Thus, the results show that we cannot reject our main hypothesis. Specification (6) also shows the relative importance of LA. An increase of one standard deviation in LA leads to a 0.116 standard deviations increase in TM. Table 2 indicates that the LA has one of the largest standardized coefficients.

Looking at the other variable we also observe that DD matters. The coefficient is statistically significant with marginal effects close to two percentage points. Frey and Stutzer (2000) argue that direct democracy and local autonomy are interdependent. Direct democracy and federal structures reinforce each other because individuals are interested in a strong federalism. They are bearing the costs and benefits of governments' activities, which help taxpayers better identify with the decision process. In general, Feld and Kirchgässner (2001) point out that: "The more important regional and local jurisdictions are in the internal organization of a nation-state, the more important is the question of the proper decision-making procedures at the different government levels. The assignment of competencies to different government levels is linked to decision-making procedures" (p. 333)⁸. However, to investigate whether the positive correlation between institutions and tax morale is largely driven by a higher institutional trust (TR), adding the variable in specifications (3) to (6) and (9) to (12) together into the same equations. The results also indicate that TR is relevant. An increase in the TR scale by one unit increases the share of subjects indicating the highest TM scale by around 3 percentage points. A priori, we may have expected that adding the trust

the IRS.

⁸ The two variables are significantly correlated at the 0.01 level ($r = 0.574$). Thus, it is difficult to separate the effects of the two variables in one model.

variable in the specification would lead to a reduced value for the institutional variable if institutional trust acts as a mediator variable. However, as specification (3) shows, we do not observe a decrease in the marginal effect of LA once we include trust.

The results also show that there is a positive correlation between CHURCH ATTENDANCE and TM. To the authors' knowledge, only a limited number of studies examine the correlation between religiosity and tax cheating (Tittle 1980; Grasmick et al. 1991; Torgler 2006). All three studies indicate that religiosity is negatively correlated with the degree of rule breaking; or in other words, is positively related to tax compliance and tax morale. Our findings are therefore in line with these results. Looking at the variables FINE RATE, AUDIT PROBABILITY and T (INDIVIDUAL TAX RATE) we find that the basic tax evasion model does not perform in a satisfactory way when considering tax morale. Deterrence shows a negative coefficient that is not statistically significant. Similarly, we observe a negative and insignificant relationship between the individual tax rate and tax morale. Similarly, the income variable is not statistically significant. The negative sign is consistent with many empirical papers analyzing the correlation between tax rates and tax evasion (see, e.g., Clotfelter 1983; Crane and Nourzad 1992)⁹. The results presented in Table 3 indicate that culture matters. French and Italian speaking individuals report a lower level of tax morale than German speaking individuals. Such a result is consistent with Alm and Torgler (2006), who report that Romanic countries have a higher tax immorality than most other northern European countries.

4 Empirical results on the shadow economy

The previous results provide strong support for our hypothesis that local autonomy matters for compliance with tax laws. In a next step we will see whether this relationship

⁹ It should also be noticed that Feinstein (1991) does not find a positive correlation between tax rates and non-compliance, trying to better separate the effects of marginal tax rates from those of income.

remains robust when focusing on the shadow economy with macro (cantonal) data. We therefore take the opportunity to extend the investigation from the attitudinal level to a behavioural one. This is especially important since it allows a further robustness check and provides the chance to control for additional variables at the cantonal level.

The shadow economy includes all market-based legal production of goods and services that are deliberately concealed from public authorities for the following reasons (Schneider 2005b):

- (1) to avoid payment of income, value added or other taxes,
- (2) to avoid payment of social security contributions,
- (3) to avoid having to meet certain legal labor market standards, such as minimum wages, maximum working hours, safety standards, etc., and
- (4) to avoid complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms.

Hence, in this paper, we will not deal with typical underground economic activities, which are all illegal actions with the characteristics of classical crimes like burglary, robbery and drug dealing. We also do not include the informal household economy which consists of all household services and production.

The size and development of the shadow economy of the 26 cantons for the years 1990, 1995 and 2000 were calculated using the following step procedure: first, the aggregated values of the size and development of the Swiss (overall) shadow economy are calculated using the currency demand approach. A currency demand equation was estimated for Switzerland over the period 1955 up to 2002. The results at the OLS estimations (corrected for first-order autocorrelation) are reported in the Appendix Table A3. The overall development of the Swiss shadow economy was calculated from this currency demand equation keeping the tax variable at its lowest value and undertaking a dynamic simulation that generates overall (aggregate) shadow economy values for the years 1990, 1995, and 2000. In order to get the disaggregated (cantonal) value we use a decomposition method. It takes

into account the sector composition and its level of shadow economy (see also Appendix Table A3 and A4). The methodology employed in these estimation procedures has been discussed in previous studies (see Schneider and Enste 2002, and Schneider 2005a,b)¹⁰. Note, that with this approach, a lot of the variation in the size of the shadow economy over time is due to the sectoral change in the cantons.

4.1 Model

To explore the relationship between local autonomy and the level of shadow economy, we propose the following baseline equation¹¹:

$$SHADOW_{it} = \alpha + \beta_1 CTL_{it} + \beta_2 C_{it} + \beta_3 DD_{it} + TD_t + CD_i + \varepsilon_{it} \quad (2)$$

where i indexes the canton in the sample, $SHADOW_{it}$ denotes cantons' size of the shadow economy as a percentage of the official GDP over the periods 1990, 1995 and 2000. C_{it} and DD_{it} are our proxies for centralization and direct democracy. We use the previous index and calculate values for these three years. The previously used proxy for local autonomy cannot be used as it has only been collected once. Thus, we take an alternative proxy that measures cantonal degree of centralization, namely the share of cantonal public spending on cantonal and local spending. The regressions also contain several control variables CTL_{it} . To control for time as well as cantonal invariant factors, we include fixed time, TD_t , and fixed cantonal effects, CD_i . It is important to control for time-specific effects in the analysis as we observe a

¹⁰ As has been extensively discussed such estimation methods have their weaknesses. The MIMIC procedure requires a clear differentiation between causes and indicators, which is not easy to achieve; the estimates are quite often not stable and if time series are used for the cause and indicator variables, they should be stationary. The currency demand approach requires observation on local domestic currency holdings as it excludes barter transactions. The assumption of the same velocity of the money in the official and underground economy can also be criticised, as well as missing variables (like tax morale, or other influences) as driving forces for the shadow economy. To summarize, all known estimation procedures for the size of the shadow economy have severe weaknesses; hence there is no best method and one has to live with an error of 15 to 20% of the size and development of the shadow economy.

secular upward trend both in the degree of fiscal centralization and the size of the shadow economy (see Figures A1 to A5). Moreover, it also helps to address concerns regarding pseudo variation in the fiscal centralization variable that is caused by business cycle effects. ε_{it} denotes the error term. In order to fulfill the ceteris paribus conditions, we have to control for a number of other important factors. GDP growth is a proxy for the level of development and prosperity of a region. A higher level of development goes together with a greater capacity to pay and collect taxes, as well as a higher relative demand for income elastic public goods and services (Chelliah 1971; Bahl 1971). In general, we would expect a negative relation between the GDP growth and the level of the shadow economy. Demographic and labor characteristics such as population size or the labor force may also affect the shadow economy. The *labor force* variable measures the potential pool that is most likely to work in the shadow economy. On the other hand, individuals with an occupation have less leisure time at their disposal. Thus, time acts as a restriction to being active in the shadow economy. *Unemployed people* have an incentive not to report their additional work hours as they may lose their financial support (Schneider and Enste 2002). In line with the micro estimations, we control for occupation. Moreover, a higher level of *urbanization* may further anonymity and thus reduce loyalty towards the state; this may lead to a higher level of shadow economy. As many sectors are city-based, it is expected that the incentives to act in the underground economy there are higher, especially when government activities and services are below individuals' expectations and preferences. Moreover, we control not only for the overall population size but (in line with the micro estimation) also for the demographic structure within a society (share of elderly and the share of pupils). Deterrence and education are further controls. As a proxy for education we use cantonal expenditures on education. This variable covers all publicly provided education spending for basic education, high-schools, professional

¹¹ See Appendix Table A1 and A2 for the description and the summary statistics of the variables.

formation and cantonal universities in Switzerland which accounts for approximately $\frac{1}{4}$ of all cantonal spendings.

We also consider the share of REGISTERED CANTONAL HOUSE PROPRIETORS on the cantonal population¹². The commitment made by house proprietors to their jurisdiction by voluntarily increasing their opportunity costs of exit option to migrate to another jurisdiction may support the willingness to remain honest. On the other hand, house proprietors have a strong demand for those economic sectors that have the highest rates of illicit work. Schneider and Enste (2002) report that building, renovating and repairing provide the largest share of illicit work (44% of the total illicit work) in Germany. Such results are also applicable to Switzerland (Table A4). Thus, home proprietors may have a stronger incentive to take advantage of such services that increase the shadow economy. Finally, we also control for transfer payments (TRANSFERS) between the federal level and the cantons according to the federal fiscal equalization scheme. The financial equalization scheme between the cantons and the federal level aims to provide equal opportunities and fair positions among the cantons with respect to the production of public goods and services. However, cantons receiving extensive transfer payments are possibly subject to the “flypaper effect” with incentives for increased government spending and thus in consequence are less financially healthy and independent. This may be an indicator of institutional weakness that may also affect compliance. Remarkably, these imperfections were also the reasons why the financial equalization system had been under pressure due to the lack of transparency and adverse incentives that promoted centralization. Moreover, the lack of incentives of cantons to fulfil their responsibilities on their own has also been criticized (Schaltegger and Frey, 2003). The fiscal burden is expected to influence the shadow economy positively. It can be argued that a higher burden increases the attractiveness of behaving illegally. We expect a positive

¹² For summary statistics see Appendix.

correlation between the fiscal burden and the size of shadow economy. However, using such a proxy has some limitations. It can be argued that it is not so much the statutory tax rates that are relevant in the decision to behave illegally, but rather their application, offering tax exceptions or concessions that affect individual decisions (Friedman et al. 2000). The authors could not find evidence that higher direct or indirect tax rates are associated with a larger unofficial economy. On the contrary, they find some evidence that higher direct tax rates are associated with a smaller shadow economy. Such results are also supported by Dreher and Schneider (2006). To analyse a further proxy for governance we consider cantonal deficits. A larger deficit may indicate that the government is responsible for a larger share of public goods provision, meaning that there is a lower incentive or higher moral costs to be active in the underground economy. On the other hand, larger deficits may induce fiscal changes in the future (e.g., increase in tax burden) that might be anticipated by the people, resulting in a counter-effect.

4.3 Empirical Results

Table 4 presents the results reporting four regressions. We report *beta* or *standardized* regression coefficients to reveal the relative importance of the variables used. To obtain robust standard errors in these estimations, we use the Huber/White/Sandwich estimators of standard errors. In all the estimations the coefficient for centralization (C) is statistically significant with relatively large beta coefficients. Thus, a higher level of centralization is positively correlated with an increase in the size of the shadow economy (SHADOW). Such a result supports our previous finding. In the second specification we add direct democracy (DD). In the following specifications we add sequentially the proxies for DETERRENCE¹³ and the

¹³ We only consider the audit probability as fine rate is directly related to tax evasion and not the shadow economy.

TAX BURDEN. The remaining two regressions also show that previous results are valid. Centralization matters at the macro level when we focus on the shadow economy and not tax morale. Thus, we find that institutional conditions are connected to individuals' attitudes and their behavior.

Looking at the control variables we find a negative relationship between DD and SHADOW. However, the coefficient is not statistically significant¹⁴. LABOR FORCE is negatively correlated with SHADOW. It seems that time acts as a restriction on being active in the shadow economy. Such a result is also supported when looking at the correlation between POPULATION>65 and SHADOW. On the other hand, the UNEMPLOYMENT RATE does not matter at all. Surprisingly, the results also show a positive correlation between EDUCATION EXPENDITURES and SHADOW. As an interpretation, this may reflect the fact that with a rising government size, opportunities in the shadow economy are also rising, independent of the specific government task. The positive relationship between TRANSFERS and SHADOW points in the same direction. We also observe that a larger deficit due to more spending in relation to revenue generation reduces the shadow economy. Moreover, an increase in the SHARE OF REGISTERED HOUSE PROPRIETORS is positively correlated with SHADOW, but the coefficient is not statistically significant. We also find the tendency for URBANIZATION and GDP GROWTH to be positively correlated with SHADOW. However, neither coefficient is statistically significant. In addition, we were not able to find a positive correlation between the fiscal burden and the size of shadow economy. It can be argued that it is not so much the statutory tax rates that are relevant in the decision to behave illegally, but rather their application (Friedman et al., 2000). The authors couldn't find evidence that higher direct or indirect tax rates are associated with a larger unofficial economy. On the contrary, they find some evidence that higher direct tax rates are associated with a smaller shadow economy. Such results are also supported by Dreher and Schneider

(2006) and Torgler and Schneider (2007b). Finally, the strength of the time and cantonal specific effects were evaluated using joint hypothesis tests. The F-statistics indicate that in both cases the hypothesis is rejected, meaning that time and cantonal specific effects play a significant role in the determination of the size of the shadow economy.

What about the causality between local autonomy and tax morale or the shadow economy? In Switzerland, people vote not only on aspects of the tax structure, but also on the institutional structure. It can be stated that values and attitudes, which may partially differ across cantons, determine the extent of institutional structure in the long run. Thus, the effect of the institutions may partly reflect values. In other words, do taxpayers with a higher tax morale demonstrate a strong preference for local autonomy or direct democratic institutions? Moreover, a substantial increase of the shadow economy can lead to a significant decrease in tax revenues and therefore to a lower quantity and quality of public goods and services. In line with Frey (2001) and Frey and Stutzer (2000) it could be argued that institutions such as local autonomy and direct democracy have a long tradition in Switzerland and are quite stable over time, which suggests that the causality runs from institutions to tax morale or the size of the shadow economy and not the other way round. Figures A2 to A7 report the changes in these institutions over time at the national and cantonal level. The cantonal values in Figures A4 and A7 indicate relative stable values. However, the boxplot in Figure A5 shows that there is a certain variation within the cantons over time (see median values and quartiles) that provides enough information to warrant investigation as a suitable explanatory determinant. In addition, one should note that the decentralization variables often exhibit a pseudo-variation which is caused by the fact that the tax base of sub-national governments is affected differently by the business cycle than the tax base of the national government.¹⁵ However, based on this analysis it is not possible to fully rule out the causality problem.

¹⁴ The coefficient is statistically significant if we do not control for year specific effects.

5 Conclusions

In the last two decades the numbers of studies investigating the underground economy or tax compliance have increased significantly. Generating statistics and empirical results are important insofar as it allows having effective and efficient resource allocation decisions. A similar tendency is observable in other areas that investigate illegal activities (Schneider and Enste 2000, 2002; and Schneider 2005a). Although there are more and more studies that investigate the causes of shadow economic activities, societies often attempt to control these activities through measures such as punishment, prosecution, economic growth or education (Schneider and Enste 2002). However, there are further instruments that merit more attention. In this respect, it is highly relevant to undertake our current investigation using other variables such as local autonomy. Thus, the basic intention of this paper was to analyse the effects of a bottom-up approach to fight the shadow economy and to increase tax morale. Specifically, we evaluate the impact of federalism on tax morale and the size of the shadow economy, a factor that the literature largely has neglected so far. We therefore provide evidence using Swiss data at the micro and macro (cantonal) level. The results indicate that local autonomy is highly relevant to an understanding of why people cooperate with societies' rules. Institutions that respect the preferences of the citizens will have more support from the people than a state that acts as a Leviathan, and thus a responsive government will enhance tax morale. Both instruments facilitate spending of taxes according to the citizens' preferences, which increases the motivation to pay the taxes. A high level of local autonomy allows the expression of one's own preferences and enhances identification with a state's institutions; this counteracts the inclination to be active in the shadow economy and increases the willingness to pay taxes. Identification therefore reduces free-rider problems. If citizens and authorities interact with a sense of collective responsibility due to the institutional structures, the system may be better

¹⁵ We are grateful to the referee for providing us with the argument.

governed and the policies more effective, as accountability promotes effectiveness through its impact on government behaviour.

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Table 1: Tax Morale and Local Autonomy

<i>ISSP 1999</i> <i>weighted ordered probit</i> <i>Dependent variable: tax morale</i>									
	<i>(1)</i>			<i>(2)</i>			<i>(3)</i>		
<i>Independent Variables</i>	<i>Coeff.</i>	<i>z- Stat.</i>	<i>Marg.</i>	<i>Coeff.</i>	<i>z- Stat.</i>	<i>Marg.</i>	<i>Coeff.</i>	<i>z- Stat.</i>	<i>Marg.</i>
a) Institutions									
LOCAL AUTONOMY (LA)	0.193***	2.79	0.056	0.187***	2.70	0.054	0.196***	2.74	0.057
b) Tax Rate									
INDIVIDUAL INC. TAX RATE (T)				-0.006	-0.24	-0.002	-0.005	-0.21	-0.001
c) Demographic Factors (CTL)									
AGE 30-49	-0.013	-0.12	-0.004	-0.014	-0.12	-0.004	0.065	0.51	0.019
AGE 50-64	-0.004	-0.03	-0.001	-0.006	-0.05	-0.002	0.063	0.40	0.018
AGE 65+	-0.029	-0.22	-0.008	-0.032	-0.24	-0.009	0.038	0.24	0.011
WOMAN	0.078	0.89	0.023	0.078	0.89	0.022	0.077	0.79	0.022
EDUCATION	0.036	1.58	0.010	0.037	1.58	0.011	0.034	1.49	0.010
d) Marital Status (CTL)									
MARRIED/LIVING TOGETHER	-0.042	-0.44	-0.012	-0.044	-0.45	-0.013	-0.066	-0.68	-0.019
DIVORCED	-0.276	-1.45	-0.071	-0.278	-1.45	-0.072	-0.299	-1.52	-0.077
SEPARATED	0.181	0.74	0.056	0.181	0.74	0.056	0.141	0.57	0.043
WIDOWED	-0.101	-0.56	-0.028	-0.102	-0.57	-0.028	-0.092	-0.50	-0.026
e) Economic Variables (Y)									
INCOME	0.1e-04	0.87	0.3e-05	0.000	0.44	0.1e-04	0.2e-04	0.38	0.4e-04
f) Employment Status (CTL)									
PART TIME EMPLOYED	-0.167	-1.22	-0.046	-0.173	-1.22	-0.047	-0.155	-1.06	-0.043
LESS THAN PART TIME	0.040	0.19	0.012	0.026	0.12	0.007	0.014	0.06	0.004
UNEMPLOYED	-0.054	-0.16	-0.015	-0.068	-0.21	-0.019	0.011	0.03	0.003
STUDENT	0.362**	2.16	0.116	0.342*	1.89	0.109	0.395**	2.53	0.128
RETIRED	0.332***	2.61	0.104	0.317**	2.15	0.099	0.319**	2.20	0.100
AT HOME	0.160	1.04	0.048	0.144	0.89	0.043	0.146	0.82	0.044
SICK	0.254	1.24	0.080	0.240	1.39	0.075	0.196	1.27	0.061
g) Religiosity									
CHURCH ATTENDANCE (CTL)	0.090***	4.52	0.026	0.090***	4.43	0.026	0.082***	3.89	0.024
h) Trust									
TRUST IN COURT AND LEGAL SYSTEM (TR)							0.096***	3.27	0.028
Observations	1114			1114			1068		
Prob > chi2	0.000			0.000			0.000		
Pseudo R2	0.027			0.027			0.030		

Notes: Dependent variable: tax morale on a four point scale. In the reference group are AGE 16-29, MAN, SINGLE, FULL TIME EMPLOYED. Significance levels: * 0.05 < p < 0.10, ** 0.01 < p < 0.05, *** p < 0.01. Marginal effect = highest tax morale score (4). Standard errors adjusted to clustering in 26 cantons.

Table 2: Robustness Tests

ISSP 1999 Dep. V.: tax morale	weighted ordered probit			weighted ordered probit			OLS	
	(4)			(5)			(6)	
Variable	Coeff.	z-Stat.	Marg.	Coeff.	z-Stat.	Marg.	Beta	t-Stat.
a) Institutions								
LOCAL AUTONOMY (LA)	0.144**	2.05	0.042	0.142**	2.00	0.041	0.116**	2.20
DIRECT DEMOCRATIC RIGHTS (DD)	0.059**	2.02	0.017	0.061*	1.80	0.018	0.055*	1.77
b) Tax Rate								
INDIVIDUAL INC. TAX RATE (T)	-0.002	-0.11	-0.001	-0.002	-0.11	-0.001	-0.002	-0.15
e) Demographic Factors (CTL)								
AGE 30-49	0.066	0.52	0.019	0.066	0.52	0.019	0.042	0.42
AGE 50-64	0.062	0.39	0.018	0.061	0.39	0.018	0.048	0.43
AGE 65+	0.024	0.15	0.007	0.024	0.15	0.007	0.045	0.28
WOMAN	0.080	0.83	0.023	0.080	0.83	0.023	0.062	0.87
EDUCATION	0.037	1.60	0.011	0.037	1.59	0.011	0.030	1.64
f) Marital Status (CTL)								
MARRIED/LIVING TOGETHER	-0.066	-0.67	-0.019	-0.065	-0.65	-0.019	-0.059	-0.76
DIVORCED	-0.297	-1.53	-0.076	-0.297	-1.54	-0.076	-0.259*	-1.88
SEPARATED	0.149	0.61	0.045	0.150	0.63	0.046	0.084	0.37
WIDOWED	-0.101	-0.56	-0.028	-0.100	-0.55	-0.028	-0.086	-0.59
g) Economic Variables (Y)								
INCOME	0.1e-04	0.29	0.3e-05	0.1e-04	0.29	0.3e-05	0.1e-04	0.45
h) Employment Status (CTL)								
PART TIME EMPLOYED	-0.151	-1.03	-0.042	-0.151	-1.04	-0.042	-0.111	-1.05
LESS THAN PART TIME	0.018	0.08	0.005	0.017	0.07	0.005	0.027	0.18
UNEMPLOYED	0.023	0.07	0.007	0.023	0.07	0.007	0.054	0.22
STUDENT	0.403***	2.60	0.131	0.404***	2.66	0.131	0.316**	2.09
RETIRED	0.339**	2.27	0.107	0.339**	2.27	0.107	0.272*	1.77
AT HOME	0.158	0.88	0.048	0.158	0.88	0.048	0.138	1.02
SICK	0.228	1.58	0.071	0.227	1.59	0.071	0.220	0.97
i) Religiosity								
CHURCH ATTENDANCE (CTL)	0.083***	3.95	0.024	0.083***	3.95	0.024	0.064***	4.18
d) Trust								
TRUST IN COURT AND LEGAL SYSTEM (TR)	0.093***	3.22	0.027	0.093***	3.23	0.027	0.080**	2.29
a) Deterrence Factors (D)								
AUDIT PROBABILITY				-0.3e-04	-0.04	-0.1e-04	0.1e-04	0.01
FINE RATE				-0.1e-03	-0.10	-0.3e-04	-0.1e-04	-0.01
Observations	1068			1068			1068	
Prob > chi2 or Prob > F	0.000			0.000			0.000	
(Pseudo) R2	0.031			0.031			0.077	

Notes: Dependent variable: tax morale on a four point scale. In the reference group are AGE 16-29, MAN, SINGLE, FULL TIME EMPLOYED. Significance levels: * 0.05 < p < 0.10, ** 0.01 < p < 0.05, *** p < 0.01. Marginal effect = highest tax morale score (4). OLS estimations: robust standard errors and beta coefficients. Standard errors adjusted to clustering in 26 cantons.

Table 3: Tax Morale and Culture

	Ordered Probit					OLS
	1a	2a	3a	4a	5a	6a
LA	0.118* <i>1.72</i> 0.034	0.116* <i>1.73</i> 0.033	0.129* <i>1.79</i> 0.037	0.127* <i>1.88</i> 0.037	0.126* <i>1.85</i> 0.036	0.102* <i>1.91</i>
LANGUAGE (LATIN)	-0.215** <i>-2.13</i> -0.060	-0.199* <i>-1.87</i> -0.056	-0.199* <i>-1.87</i> -0.056	-0.186 <i>-1.05</i> -0.052	-0.192 <i>-1.06</i> -0.053	0.673* <i>1.92</i>
T	NO	YES	YES	YES	YES	YES
TR	NO	NO	YES	YES	YES	YES
DD	NO	NO	NO	YES	YES	YES
D	NO	NO	NO	NO	YES	YES
CTL	YES	YES	YES	YES	YES	YES
Observations	1114	1068	1068	1068	1068	1068
Prob > chi2 or Prob > F	0.000	0.000	0.000	0.000	0.000	0.000
(Pseudo) R2	0.029	0.032	0.032	0.032	0.032	0.079

Notes: Dependent variable: tax morale on a four point scale. In the reference group are AGE 16-29, MAN, SINGLE, FULL TIME EMPLOYED. Significance levels: * $0.05 < p < 0.10$, ** $0.01 < p < 0.05$, *** $p < 0.01$. Marginal effect = highest tax morale score (4). z-statistics and t-statistics in italics, marginal effects in bold. OLS estimations: robust standard errors and beta coefficients. Standard errors adjusted to clustering in 26 cantons.

Table 4 Impact of Centralization on the Size of the Shadow Economy

Dep. variable: shadow economy	<i>Beta</i> (7)	t-stat.	<i>Beta</i> (8)	t-stat.	<i>Beta</i> (9)	t-stat.	<i>Beta</i> (10)	t-stat.
CENTRALIZATION (C)	0.368**	2.12	0.365**	2.09	0.314*	1.82	0.304*	1.71
DIRECT DEMOCRACY (DD)			-0.155	-1.08	-0.154	-1.05	-0.121	-0.71
GDP GROWTH	0.058	1.20	0.067	1.29	0.067	1.37	0.061	1.19
TRANSFERS	-0.101	-1.47	-0.084	-1.20	-0.081	-1.22	-0.079	-1.19
DEFICITS	-0.246***	-4.55	-0.233***	-4.47	-0.222***	-4.35	-0.223***	-4.32
EDUCATION EXPENDITURES	0.261**	2.13	0.267**	2.13	0.235**	2.16	0.226**	2.06
LABOR FORCE	-0.134*	-1.88	-0.161*	-1.92	-0.182*	-1.93	-0.172*	-1.71
UNEMPLOYMENT RATE	-0.002	-0.04	0.008	0.11	0.025	0.36	0.014	0.19
URBANIZATION	0.407	0.70	0.492	0.80	0.537	0.80	0.437	0.62
POPULATION SIZE	-6.456**	-2.54	-6.470**	-2.54	-6.037**	-2.68	-6.137**	-2.65
POPULATION <15	0.432**	2.67	0.442**	2.70	0.410***	2.89	0.356**	2.12
POPULATION >65	0.255**	2.70	0.253**	2.62	0.248**	2.39	0.263**	2.43
SHARE OF REGISTERED HOUSE PROPRIETORS	-0.473	-0.98	-0.473	-0.99	-0.433	-0.95	-0.576	-0.98
DETERRENCE					0.100	0.92	0.080	0.67
TAX BURDEN							0.063	0.65
State (Canton) Effects	Yes		Yes		Yes		Yes	
Year Effects	Yes		Yes		Yes		Yes	
F-Test Cantons	19.59***		21.70***		19.17***		16.03***	
F-Test Year	19.69***		17.76***		20.33***		15.06***	
Prob > F	0.000		0.000		0.000		0.000	
Observations	78		78		78		78	
R-squared	0.981		0.981		0.982		0.982	

Notes: *t*-statistics in parentheses. Significance levels: * 0.05 < p < 0.10, ** 0.01 < p < 0.05, *** p < 0.01.

Table A1 Derivation of variables ISSP

Variable	Derivation
TAX MORALE (TM, DEPENDENT VARIABLE)	Do you feel it is wrong or not wrong if a taxpayer does not report all of his or her income in order to pay less income taxes? (1. not wrong, 2. a bit wrong, 3. wrong, 4. seriously wrong).
LOCAL AUTONOMY (LA)	Local autonomy is measured at the cantonal level (c) with an index developed by Ladner (1994) based on survey results where chief local administrators in 1865 Swiss municipalities were asked to report how they perceive their local autonomy on a 10 point scale. (1= no autonomy, 10 = very high communal autonomy).
DIRECT DEMOCRACY (DD)	Index of direct democracy, own calculation based on Stutzer (1999).
TRUST IN COURT AND THE LEGAL SYSTEM (TR)	How much confidence do you have in courts and the legal system (5=complete confidence to 1=no confidence at all)
FINE RATE (D)	Standard legal fine (in percent) as a multiple of the evaded tax amount based on questionnaire data of Frey and Feld (2002); and Feld and Frey (2002a, 2002b)
PROBABILITY OF DETECTION (D)	Number of tax auditors per taxpayer (in %) based on questionnaire data of Frey and Feld (2002); and Feld and Frey (2002a, 2002b)
INDIVIDUAL TAX RATE (T)	Own calculations based on the average weighted value (in percentage) working with the income information done by the ISSP. From the tax table (Steuerbelastung in der Schweiz 1999, p. 48) the value closest to the ISSP income values (midpoint) is used. For simplicity, no differentiation between singles and married people has been made, working with the individual tax rate table for singles.
CHURCH ATTENDANCE (CTL)	How often do you take part in the activities or organisations of a church or a place of worship, other than attending services? Never (1), less than once a year, about once or twice a year, several times a year, about once a month, 2-3 times a month, nearly every week, every week, several times a week (9)
INCOME (Y)	Monthly earnings from employment in Swiss francs (midpoints)
EDUCATION (CTL)	What is the highest educational level that you have attained? <ol style="list-style-type: none"> 1. Incomplete primary school 2. Primary school (up to 12 years of age) 3. Incomplete secondary 4. Secondary completed 5. Incomplete + complete semi-higher qualification, incomplete university, others 6. University completed
LATIN	French and Italian speakers.

Source: ISSP (1998)

Table A2 Summary statistics micro

Variables	Obs	Mean	Std. Dev.	Min	Max
TAX MORALE (TM)	1143	1.767	0.917	0	3
LOCAL AUTONOMY (LA)	1204	4.737	0.662	3.2	6.1
DIRECT DEMOCRATIC RIGHTS (DD)	1204	3.599	1.203	1.75	5.69
INDIVIDUAL INC. TAX RATE (T)	1204	5.890	6.234	0	25.14
AGE 30-49	1204	0.450	0.498	0	1
AGE 50-64	1204	0.241	0.428	0	1
AGE 65+	1204	0.123	0.328	0	1
WOMAN	1204	0.534	0.499	0	1
EDUCATION	1201	3.657	1.681	1	7
MARRIED/LIVING TOGETHER	1196	0.535	0.499	0	1
DIVORCED	1196	0.058	0.233	0	1
SEPARATED	1196	0.023	0.151	0	1
WIDOWED	1196	0.053	0.223	0	1
INCOME	1204	2911.296	3445.100	0	22500
PART TIME EMPLOYED	1201	0.143	0.350	0	1
LESS THAN PART TIME	1201	0.068	0.252	0	1
UNEMPLOYED	1201	0.014	0.118	0	1
STUDENT	1201	0.072	0.258	0	1
RETIRED	1201	0.142	0.350	0	1
AT HOME	1201	0.087	0.283	0	1
SICK	1201	0.009	0.095	0	1
CHURCH ATTENDANCE	1188	2.582	1.825	1	9
TRUST IN COURT AND LEGAL SYSTEM (TR)	1146	3.119	0.906	1	5
AUDIT PROBABILITY (D)	1204	53.006	36.141	7.05	188.98
FINE RATE (D)	1204	78.241	33.292	30	200
LATIN	1204	0.375	0.484	0	1

Note: 38% of the individuals stated that they have no own income or no paid work. Excluding this group leads to a mean in the individual tax rate of 9.8 percent.

Table A3 Currency demand equation

$\log(\text{currency outside banks}/M2)_t =$	-3.501 (-0.147)	absolute term
	+0.334 (1.46)	$\log(\text{real GDP})_t$
	+0.009 (1.49)	wage quota (percent of the wage sum to total income) $_t$
	-0.034* (-2.24)	(interest rate on government bonds) $_t$
	+0.022* (2.43)	burden of direct and indirect taxation (total taxes in percent of GDP) $_t$
	+0.884** (+3.88)	$\log(\text{currency outside banks}/M2)_{t-1}$
$\bar{R}^2 = 0.97$		
F = 188.9		
h = 1.43		
Rho = 0.97		
d.f. = 44		
Note: t-statistics parentheses		

Table A4 Swiss shadow economy in the he following five sectors:

(1) construction, craftsmanship including repairing	36%
(2) Other craftsmanship and industrial firms (cars, machinery ...)	17%
(3) The whole service sector in hotels, restaurants, also catering, etc.	18%
(4) Entertainment sector, prostitution, gambling, etc.	14%
(5) Other craftsmanship and all household services, cleaning, gardening, ironing, babysitting, etc.	15%

Notes: These values are for the year 2006 and are taken from Schneider, Torgler and Schaltegger (2008).

Table A5 Descriptive statistics for macro analysis

Variable name	Description	Source
SHADOW ECONOMY	Size of the shadow economy per capita (in Mio CHF deflated to the year 1990)	Own calculations (see Appendix)
GOVERNMENT CENTRALIZATION	Share of cantonal public spending on cantonal and local spending	Swiss Federal Finance Administration
DIRECT DEMOCRACY	Index of direct democracy	Own calculation based on Stutzer (1999)
GDP GROWTH	Logarithm of real cantonal GDP growth per capita	Own calculation based on BAK Basel Economics
EDUCATION EXPENDITURES	publicly provided cantonal education spending (logarithmized in the estimations)	Swiss Federal Finance Administration
TRANSFERS	Transfer payments between the federal level and the cantons according to the federal fiscal equalization scheme (logarithmized in the estimations)	Swiss Federal Finance Administration
DEFICIT	Real public revenues – real public spending per capita (GDP-deflator for 1980 = 1)	Swiss Federal Statistical Office
LABOR FORCE	Share of employment on the cantonal population	Swiss Federal Statistical Office
UNEMPLOYMENT RATE	Share of unemployment on the cantonal population	Own calculations on the basis of Swiss Federal Statistical Office
URBANIZATION	Proportion of local communities having more than 10'000 inhabitants.	Swiss Federal Statistical Office
POPULATION SIZE	Cantonal population size (logarithmized in the estimations).	Swiss Federal Statistical Office
POPULATION <15	Share of cantonal population over age 65 on total cantonal population	Swiss Federal Statistical Office
POPULATION >65	Share of cantonal population under age 15 on total cantonal population	Swiss Federal Statistical Office
SHARE OF REGISTERED HOUSE PROPRIETORS	Share of registered house proprietors	Swiss Federal Statistical Office
DETERRENCE	Number of tax auditors per taxpayer (in %)	Based on questionnaire data of Frey and Feld (2002); and Feld and Frey (2002a, 2002b)
TAX BURDEN	Cantonal tax burden	Swiss Federal Statistical Office

Table A6 Summary statistics macro

VARIABLES	Obs	Mean	Std. Dev.	Min	Max
SHADOW ECONOMY	78	0.004	0.002	0.002	0.012
GOVERNMENT CENTRALIZATION	78	0.680	0.102	0.526	0.978
DIRECT DEMOCRACY	78	4.256	1.200	1.583	5.833
GDP GROWTH	78	0.008	0.010	-0.020	0.024
EDUCATION EXPENDITURES	78	2.449	0.157	2.169	2.874
TRANSFERS	78	3.176	0.076	3.051	3.458
DEFICIT	78	23.300	242.190	-668.882	710.058
LABOR FORCE	78	0.502	0.027	0.439	0.564
UNEMPLOYMENT RATE	78	1.879	1.800	0.000	7.000
URBANIZATION	78	0.324	0.250	0.000	0.994
POPULATION SIZE	78	269450	279041	13573	1211647
POPULATION <15	78	0.183	0.022	0.116	0.232
POPULATION >65	78	0.148	0.020	0.108	0.209
SHARE OF REGISTERED HOUSE PROPRIETORS	78	0.412	0.111	0.127	0.612
DETERRENCE	78	63.188	41.433	3.139	188.98
TAX BURDEN	78	102.606	19.264	55.80	154.10

Figure A1 Size of the Shadow Economy at the Cantonal Level in Mio CHF (deflated to the year 1990)

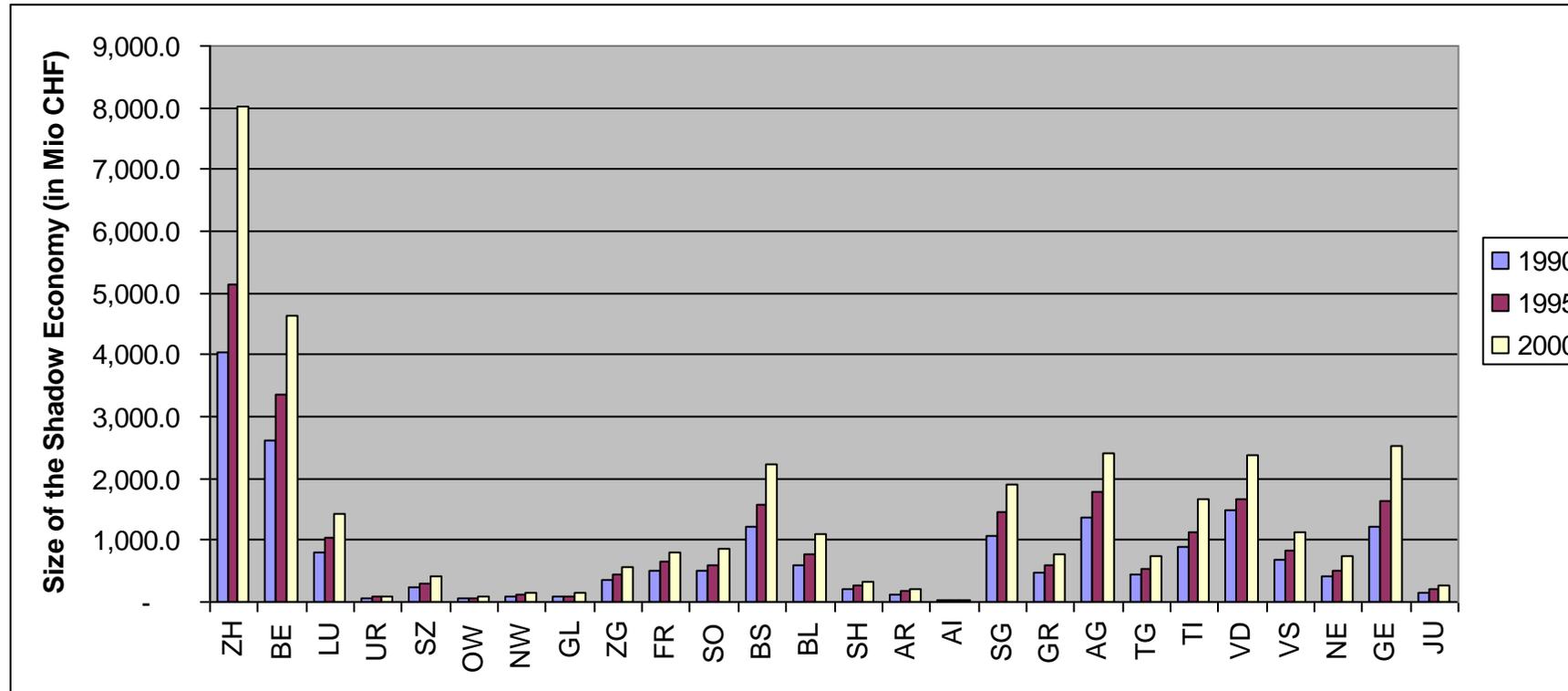


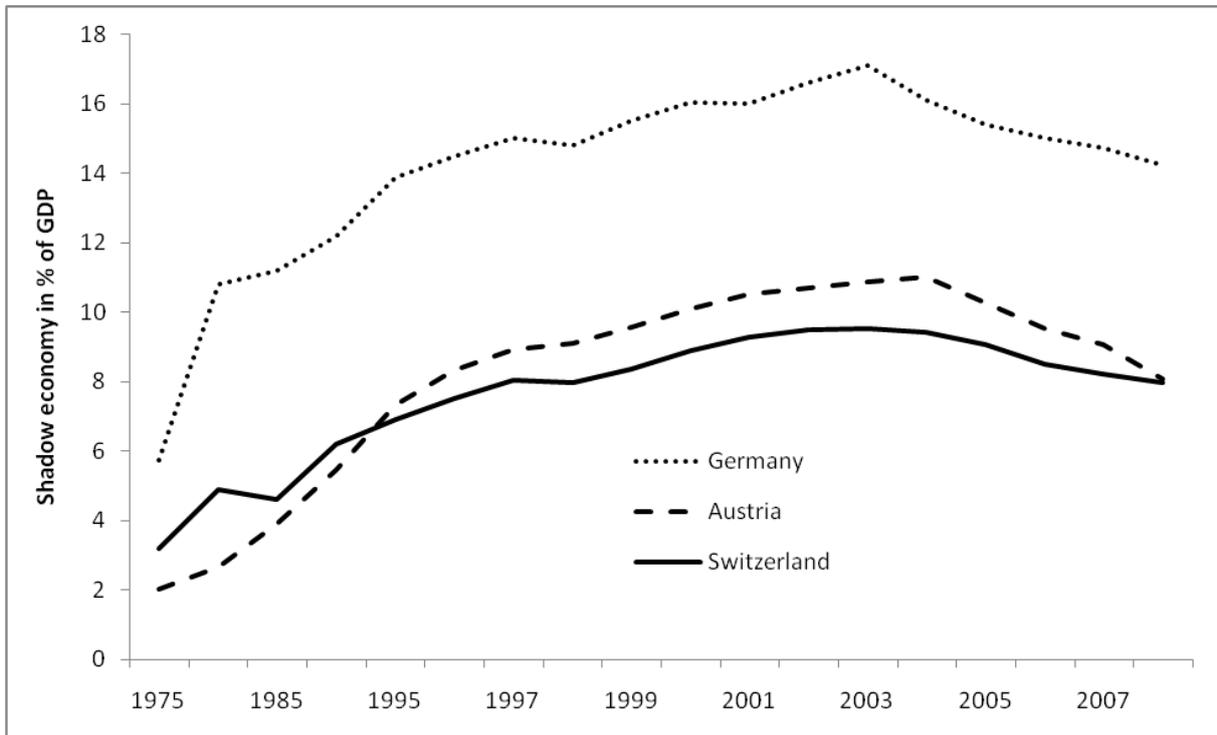
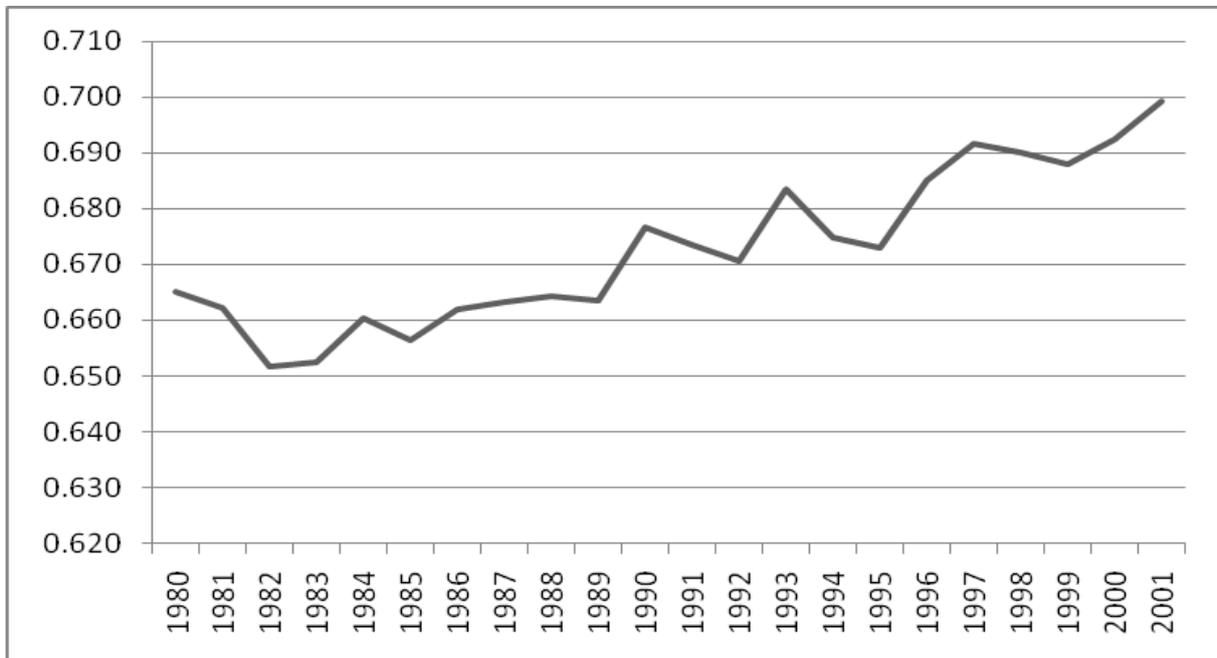
Figure A2 Shadow economy over time in Switzerland, Germany and Austria**Figure A3:** Government centralization over time (share of state spendings on state and local spendings) over 26 cantons

Figure A4: Government centralization at the cantonal level of over time

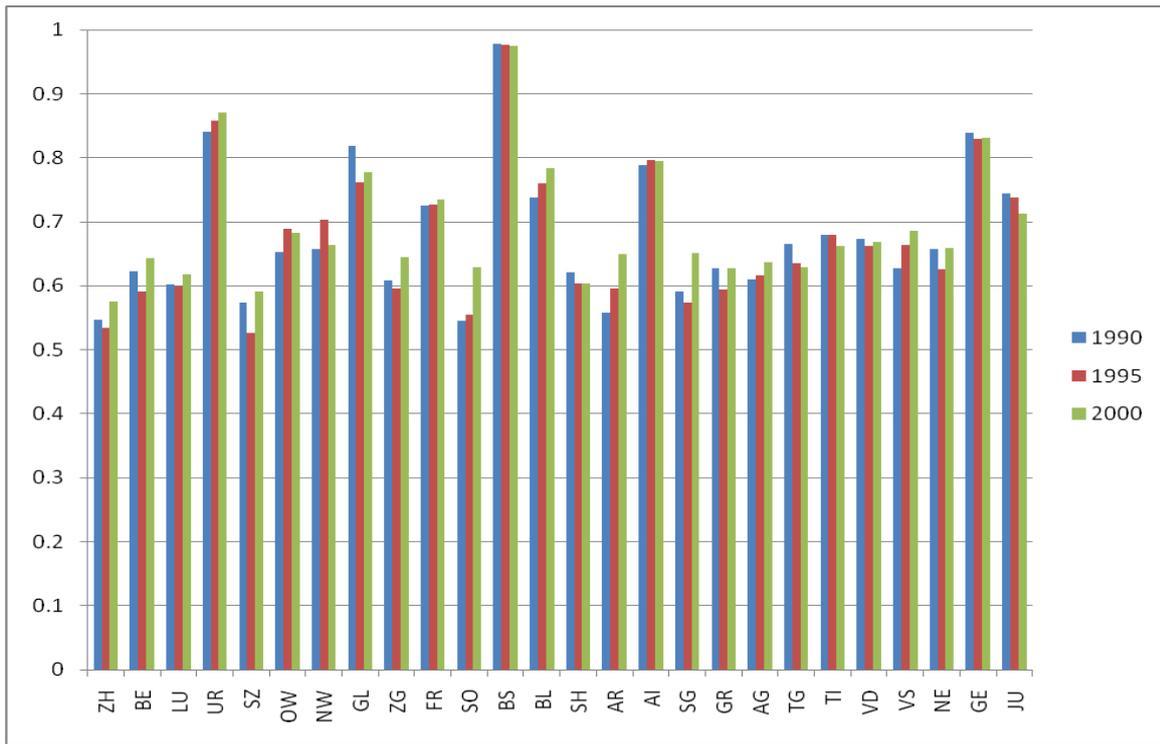


Figure A5: Boxplot Reporting the Variation Between 1981 and 2001

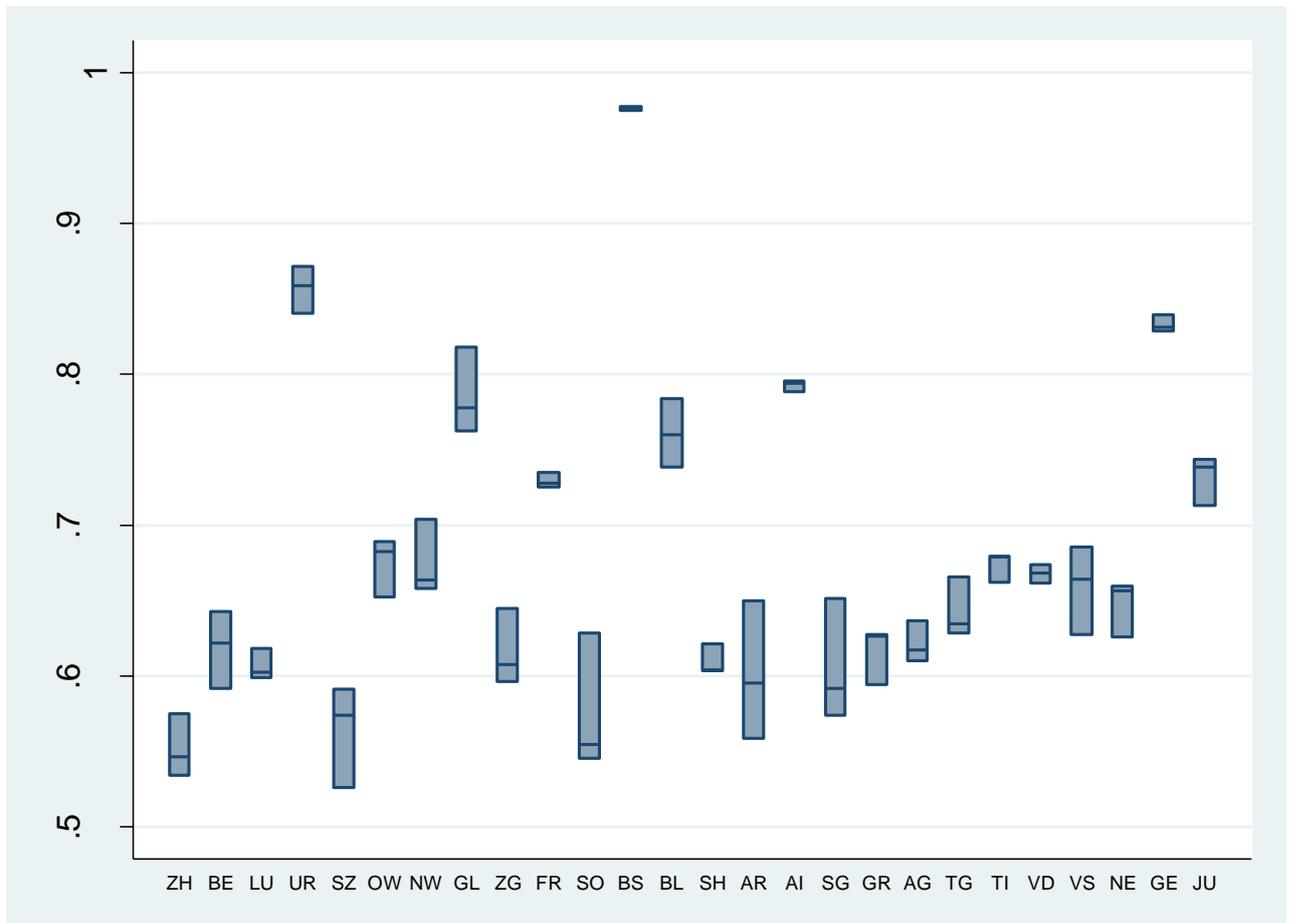


Figure A6 Development of direct democracy over time in Switzerland (Frey-Stutzer-Index)

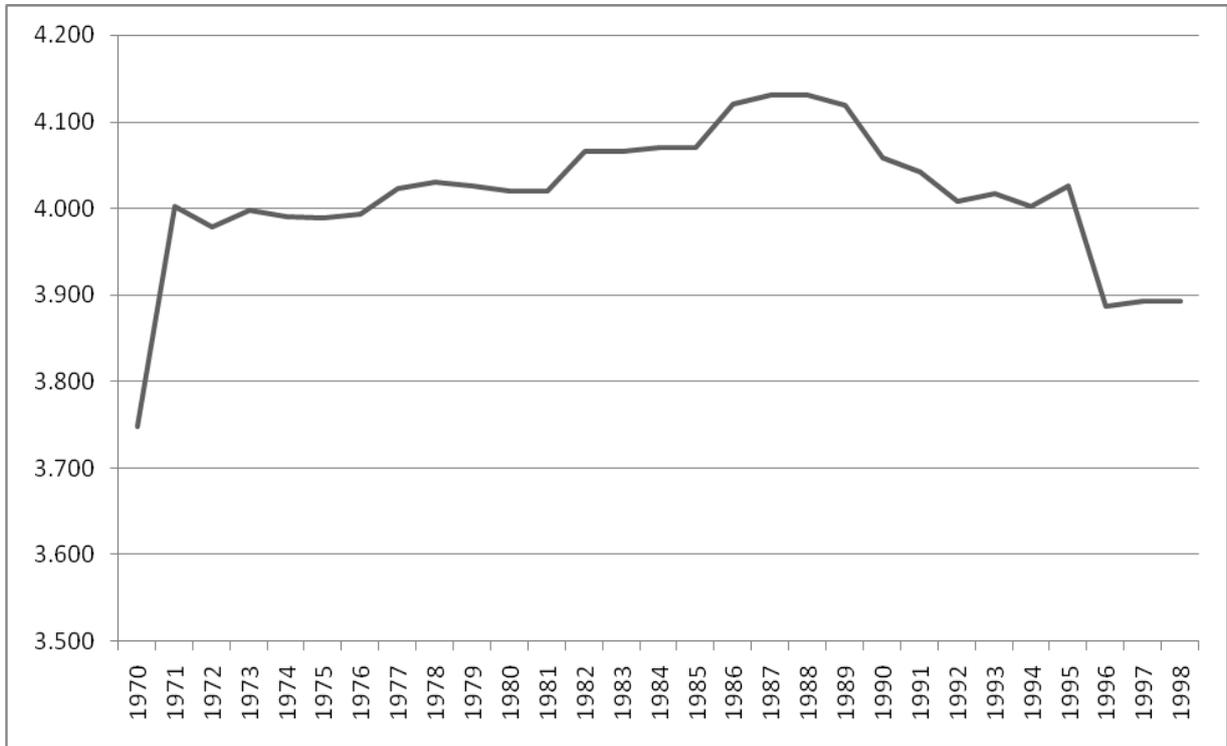
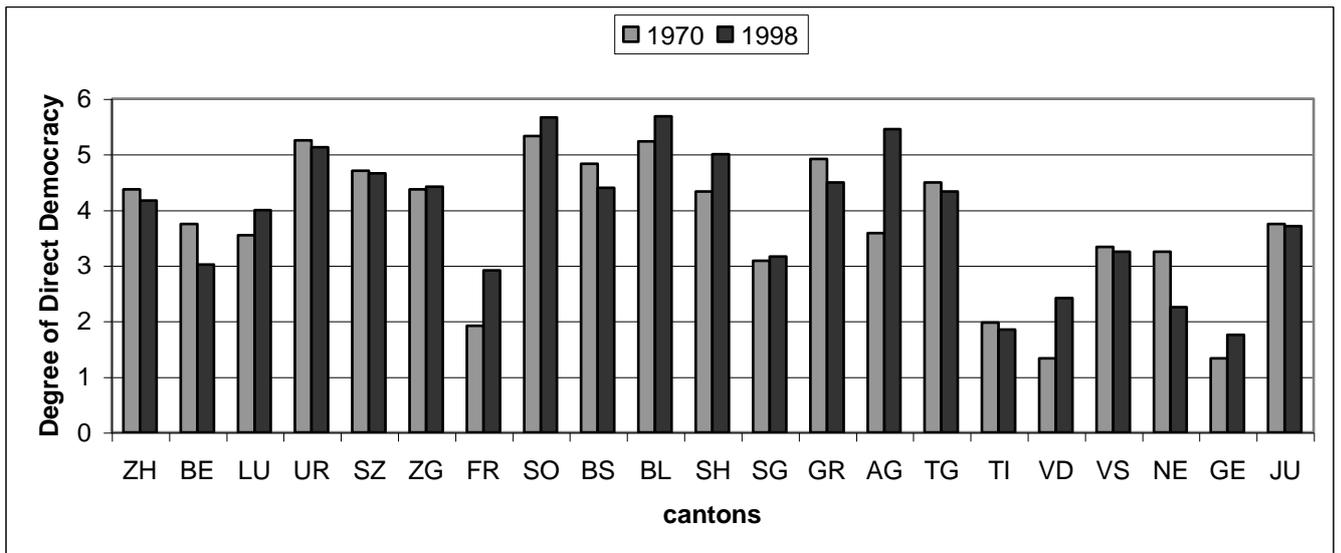


Figure A7 Degree of Direct Democracy Between 1970 and 1998 at the Cantonal Level



Notes: The cantons, which have or had until recently the 'Landsgemeinde' (town meeting) (Appenzell I. Rh., Obwalden, Glarus, Appenzell A. Rh. and Nidwalden), have not been included in these estimations.