# Local Autonomy, Tax Morale and the Shadow Economy

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**Abstract** Policymakers often propose strict enforcement strategies to fight the shadow economy and to increase tax morale. However, there is also a bottom-up approach such as, for example, decentralizing the political power to those who are close to the problems. Thus, this paper analyses the relationship between local autonomy and tax morale or the size of the shadow economy. We use data on tax morale at the individual level and macro data of the size of the shadow economy to systematically analyse the relevance of local autonomy and compliance in Switzerland, a country where the degree of federalism varies across different cantons. 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

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# 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 "enforce" people to pay their taxes establishing a deterrence policy. In line with the economic-of-crime approach based on the expected utility maximisation calculus, Allingham and Sandmo (1972) presented a formal model with the insight that the extent of tax evasion is negatively correlated with the probability of detection and the degree of punishment. However, this pathbreaking model has been criticised by many authors (see, e.g., Graetz and Wilde 1985; Alm, McClelland and Schulze 1992; Frey and Feld 2002). A main point, which is connected to the empirical and experimental findings, is that these deterrence models predict too much tax evasion. In many countries the level of deterrence is too low to explain the high degree of tax compliance. Furthermore, there is a big gap between the amount of risk aversion that is required to guarantee such a 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 percent (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 morale[1] can help explaining the high degree of tax compliance (for empirical and

[1] First important findings in the tax morale literature date from the 60s and 70s by German scholars around Günter Schmölders (1951/1952, 1960, 1962, 1970) known as the 'Cologne school of tax psychology'. They have

experimental 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). Erard and Feinstein (1994) in their theoretical paper stress the relevance of integrating moral sentiments into the models to provide a reasonable explanation of actual compliance behaviour. Moreover, Andreoni, Erard and Feinstein (1998) point out in their tax compliance survey that "adding moral and social dynamics to models of tax compliance is as yet a largely undeveloped area of research" (p. 852). Many researchers stress that a considerable portion of taxpayers are always honest. Some taxpayers are "simply predisposed not to evade" (Long and Swingen 1991, p. 130) and thus do not even search for ways to cheat at taxes (see Frey 1999). More and more papers go beyond treating tax morale as a black box, a residuum, analysing which factors shape or maintain tax morale (for an overview see Torgler 2007). Also, there is an increased attention by policymakers to understand the driving forces of tax morale and the possibilities to influence the willingness to pay taxes.

In the first part of the paper, we investigate using Swiss data whether there is a relationship between decentralizing the political competencies to those who are close to the problems and by giving them the final say and the willingness to comply. That means we evaluate if local autonomy are correlated with tax morale controlling for other factors. For this, the study investigates 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 using the size of the shadow economy instead of tax morale as dependent variable. A relevant issue is whether influences obtained on tax morale are also reflected in real, or observed, behaviors. Thus, it may be interesting to complement an approach at the attitudinal level with a more output oriented variable, namely the shadow

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emphasised that economic phenomena should not only be analysed from the traditional point of view. They saw tax morale as an attitude regarding tax (non-) compliance (see, e.g., Schmölders 1960).

economy. Moreover, Alm, Martinez-Vazquez, and Schneider (2004) argue that the size of the underground economy can serve as a useful, if somewhat imperfect, measure of the extent of tax evasion. Thus, in the second part of the paper we will investigate to which extent local autonomy affects the size of the shadow economy using also Swiss data complemented the micro approach with a macro approach at the cantonal level. It is essential to analyze under which conditions it is more likely that citizens pay their taxes. Switzerland is chosen because it allows to observe 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 as 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 too low incomes. On the other hand, not submitted tax declarations are 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 their taxes when they are able to select themselves 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. Torgler and Schneider (2007b), for example, using more than 25 proxies that measure governance and institutional quality they find strong support that its increase leads to a smaller shadow economy. However, they disregarded the analysis of decentralization and local autonomy.

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

## 2 Decentralisation

The literature on fiscal federalism pioneered by Oates' (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 better tailored public goods 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). Whereas disadvantages of decentralisation are seen in various kinds of distortions: namely urban externalities, fiscal externalities (vertically and horizontally) and local protection which may result in a race to the bottom with taxes and consequently an underprovision of public goods (see Oates, 1999 for a survey).

Also in the case of tax policy, small structures have the advantage that citizens' preferences can be met better than in a framework where a uniform tax system is designed for a population with heterogeneous preferences. Moreover, there is an intensive every-day 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 put 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 a higher transparency between the tax price and the received public services. 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, who have 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 combined with 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 worked 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 economy*[3].

## 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 morale[4]:

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

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 a smaller share of taxpayers directly.

The measurement of tax morale is not free of bias. First, because the available data are based on self-reports in which subjects tend to overstate their degree of compliance (Andreoni, Erard, and Feinstein 1998), no objective or 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 as regards 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:

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

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 tell 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 in the ISSP data set the confidence in the courts and the legal system[6]. In a general way, 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 criticize 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 work better. This would, for example, suggest that an improvement in tax morale is independent of whether a particular citizen has the possibility to vote. Thus, to isolate

[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 to use an instrument, the time span to collect the signatures and the level of new expenditure which allows to use the financial referendum (for a detailed discussion see Stutzer, 1999).

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

the relationship between institutions and tax morale it is important to control for institutional trust. Alternatively, one could also try to include a dummy for foreigner, 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 using as an approximation 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.
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 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*

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 to find 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 1999) are shown[7].

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 culture differences using a language dummy LATIN (French and Italian speaking individuals) while running all the previous

[7] The obtained results remain also robust when run estimations with standard errors adjusted to clustering on

specifications. 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 the LA by one point raises the share of persons indicating the highest TM value by more than 3 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 2 percentage points. Frey and Stutzer (2000) argue that direct democracy and local autonomy are interdependent. Direct democracy and federal structures foster each other because individuals are interested in a strong federalism. They are bearing the costs and benefits of governments' activities, which help taxpayers to get a better identification. 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 are largely driven by a higher institutional trust (TR), we add 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. In advance we may have expected that adding the trust variable in the

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cantons.

[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.

specification would lead to a decrease of the institutional variable in case institutional trust acts as a mediator variable. However, as specification (3) shows we don't 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 author's knowledge only a limited amount 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 focusing on tax morale. Deterrence shows a negative relationship with the coefficients that are not statistically significant. Similarly, we observe a negative and insignificant relationship between the individual tax rate and tax morale and the same for the income variable. The negative sign is consistent with many empirical papers analysing the correlation between tax rates and tax evasion (see, e.g., Clotfelter 1983; Crane and Nourzad 1992)[9]. Finally, looking at Table 3 we also observe 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 that local autonomy matters. In a next step we will see whether this relationship remain robust when focusing on the shadow economy

[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.

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, drug dealing, etc. 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 three step procedure: In a first step from 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. In a second step from this currency demand equation the overall development of the Swiss shadow economy was calculated. This is done by keeping the tax variable at its lowest value 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

in a third step a decomposition method. It takes into account the sector composition and its level of shadow economy (see also Appendix Table A3 and A4). The fundament of the methodology of such estimation procedures has been discussed in previous studies (see Schneider and Enste 2002, and Schneider 2005a,b)[10].

*4.1 Model*

To explore the relationship between local autonomy and the level of shadow economy, we propose the following baseline equation[11]:

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

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

[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 domestic locals currency it excludes barter transactions, also the assumption of the same velocity of the money in the official and underground economy can 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.

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

for both, the degree of fiscal centralization and the size of the shadow economy a secular upward trend (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. $\varepsilon_{it}$ 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 has the best preconditions 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 otherwise they would lose their financial support (Schneider and Enste 2002). Controlling for occupation is in line with the micro estimations. 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 there the incentives to act in the underground economy are higher, especially when government activities and services are below individuals' expectations and preferences. Moreover, we not only control for the overall population size but also in line with micro estimation we control for the demographic structure within a society (share of elderly and the share of pupils). In line with the micro estimations we also control for deterrence and education. As a proxy for education we use cantonal expenditures in education. This variable covers all publicly provided education spending for basic education, high-schools, professional formation and cantonal universities in Switzerland which accounts for approximately ¼ of all cantonal spendings.

We also consider the share of REGISTERED CANTONAL HOUSE PROPRIETORS on the cantonal population[12]. The commitment made by house proprietors to their jurisdiction by voluntarily increasing their opportunity costs for the 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, repairing provide the largest share of illicit work (44% of the total illicit work) in Germany. Such results are also applicable to Switzerland. Thus, home proprietors may have a stronger incentive to take advantage of such services which increases 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 has the aim 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 affect compliance, too. Remarkably, these imperfections were also reason 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 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

[12] For summary statistics see Appendix.

exceptions or concessions that affect individual decisions (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). To get a further proxy for governance we consider also cantonal deficits. A larger deficit may indicate that the government a larger share of public goods which may lead 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 which may lead to 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, 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 DETERRENCE[13] and the TAX BURDEN. Also the remaining two regressions show that previous results are valid. Centralization matters at the macro level focusing on the shadow economy and not tax morale.

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

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 significant[14]. LABOR FORCE is negatively correlated with SHADOW. It seems that time acts as a restriction of 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 larger spending in relation to revenues 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 that URBANIZATION AND GDP GROWTH to be positively correlated with SHADOW. However, both coefficients are not statistically significant. In addition, we were not able to find a positive correlation between the fiscal burden and the size of shadow economy. Admittedly, using the tax burden 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 (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 cannot only vote on aspects of the tax structure, but also on the institutional structure. It can be stated that values and attitudes, which may partly differ across cantons, determine the extent of institutional structure in the long run. Thus, the effect of the institutions may partly reflect values. Or in other words, do taxpayers with a higher tax morale choose stronger a 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 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 of these institutions over time at the national and cantonal level. The cantonal values in Figures A4 and A7 indicate relative stable values over time. 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 be investigated 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 don't control for year specific effects.
[15] We are grateful to the referee for providing us with the argument.

## 5 Conclusions

In the last two decades the numbers of studies investigating the underground economy or tax compliance have strongly increased. Generating statistics and empirical results are insofar important 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 aspect, it is highly relevant to investigate 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 has strongly 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 understand why people cooperate with societies' rules. Institutions that respect the preferences of the citizens will have more support by the people than a state that acts as a Leviathan, and thus a responsive government will enhance tax morale. Both instruments help spend taxes according to the citizens' preferences, which increases the motivation to pay the taxes. A high level of local autonomy allows expressing one's own preferences and enhances identification with a state's institutions; this counteracts the inclination to be active in the shadow economy and increase the willingness to pay taxes. Identification reduces therefore free-rider problems. If citizens and authorities interact with a sense of collective responsibility thanks to the

institutional structures, the system may be better 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

| *ISSP 1999*<br>*weighted ordered probit*<br>*Dependent variable: tax morale* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *(1)* | | | *(2)* | | | *(3)* | | |
| *Independent Variables* | *Coeff.* | *z-Stat.* | *Marg.* | *Coeff.* | *z-Stat.* | *Marg.* | *Coeff.* | *z-Stat.* | *Marg.* |
| ***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 | | |
| Pseduo 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*<br>*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* | 0.116* | 0.129* | 0.127* | 0.126* | 0.102* |
| | *1.72* | *1.73* | *1.79* | *1.88* | *1.85* | *1.91* |
| | **0.034** | **0.033** | **0.037** | **0.037** | **0.036** | |
| LANGUAGE (LATIN) | -0.215** | -0.199* | -0.199* | -0.186 | -0.192 | 0.673* |
| | *-2.13* | *-1.87* | *-1.87* | *-1.05* | *-1.06* | *1.92* |
| | **-0.060** | **-0.056** | **-0.056** | **-0.052** | **-0.053** | |
| 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 | *Beta* *(7)* | t-stat. | *Beta* *(8)* | t-stat. | *Beta* *(9)* | t-stat. | *Beta* *(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 AN 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?<br>1. Incomplete primary school<br>2. Primary school (up to 12 years of age)<br>3. Incomplete secondary<br>4. Secondary completed<br>5. Incomplete + complete semi-higher qualification, incomplete university, others<br>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 (currency outside banks/M2)$_t$ = | -3.501<br>(-0.147) | absolute term |
| | +0.334<br>(1.46) | log (real GDP)$_t$ |
| | +0.009<br>(1.49) | wage quota (percent of the wage sum to total income)$_t$ |
| | -0.034*<br>(-2.24) | (interest rate on government bonds)$_t$ |
| | +0.022*<br>(2.43) | burden of direct and indirect taxation (total taxes in percent of GDP)$_t$ |
| | +0.884**<br>(+3.88) | log (currency outside banks/M2)$_{t-1}$ |
| $\overline{R^2}$ = 0.97<br>F = 188.9<br>h = 1.43<br>Rho = 0.97<br>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)

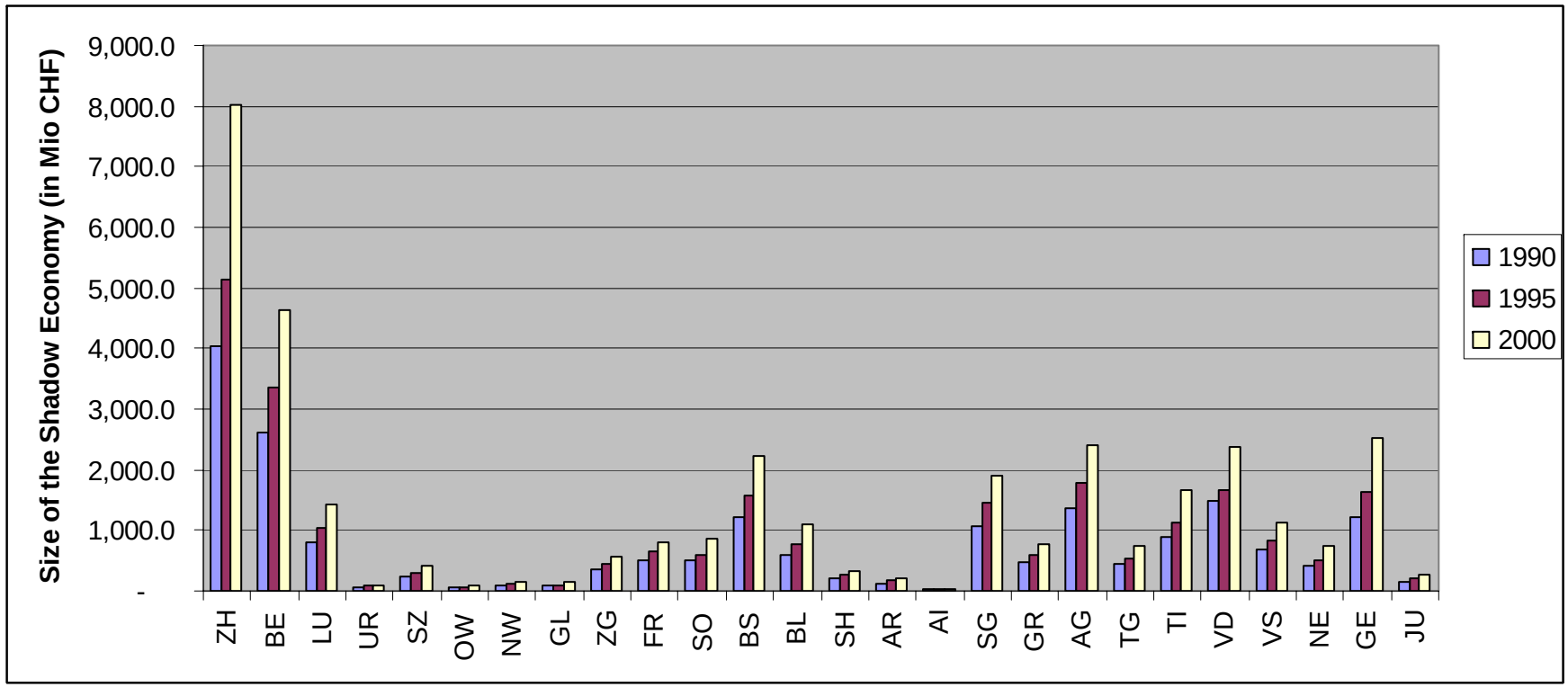


**Figure A2** Shadow economy over time in Switzerland, Germany and Austria

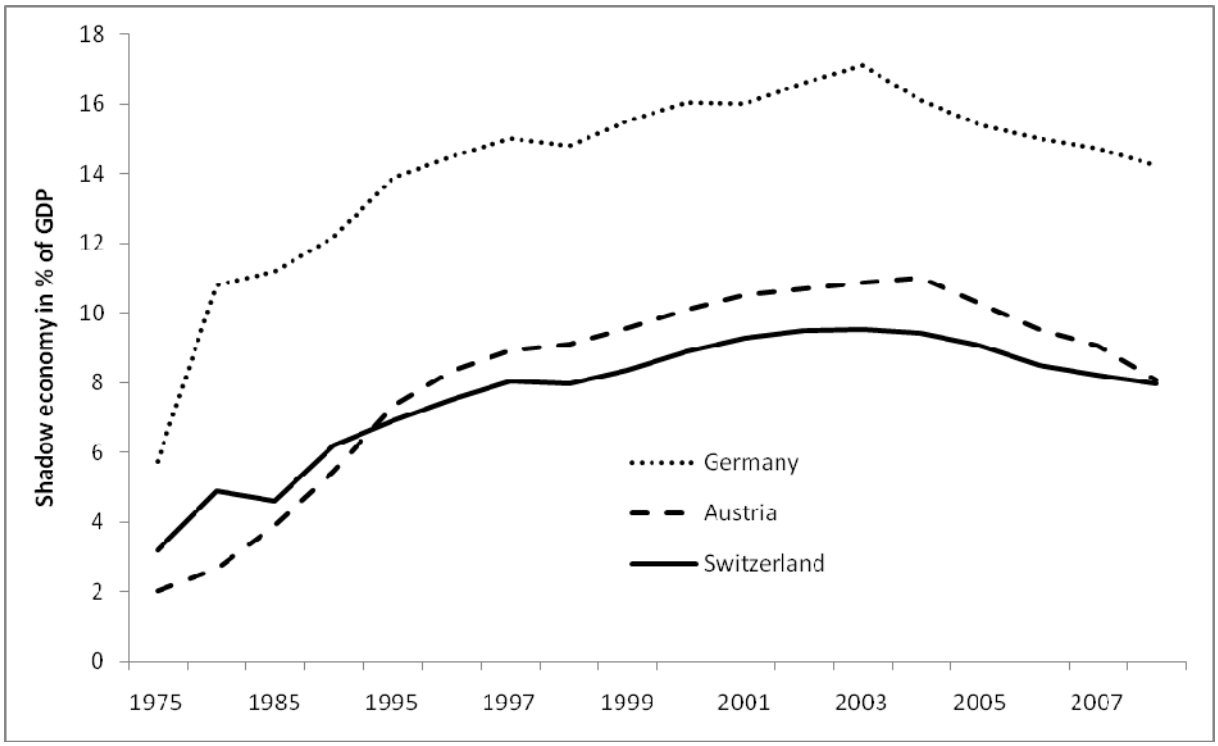



**Figure A3**: Government centralization over time (share of state spendings on state and local spendings) over 26 cantons

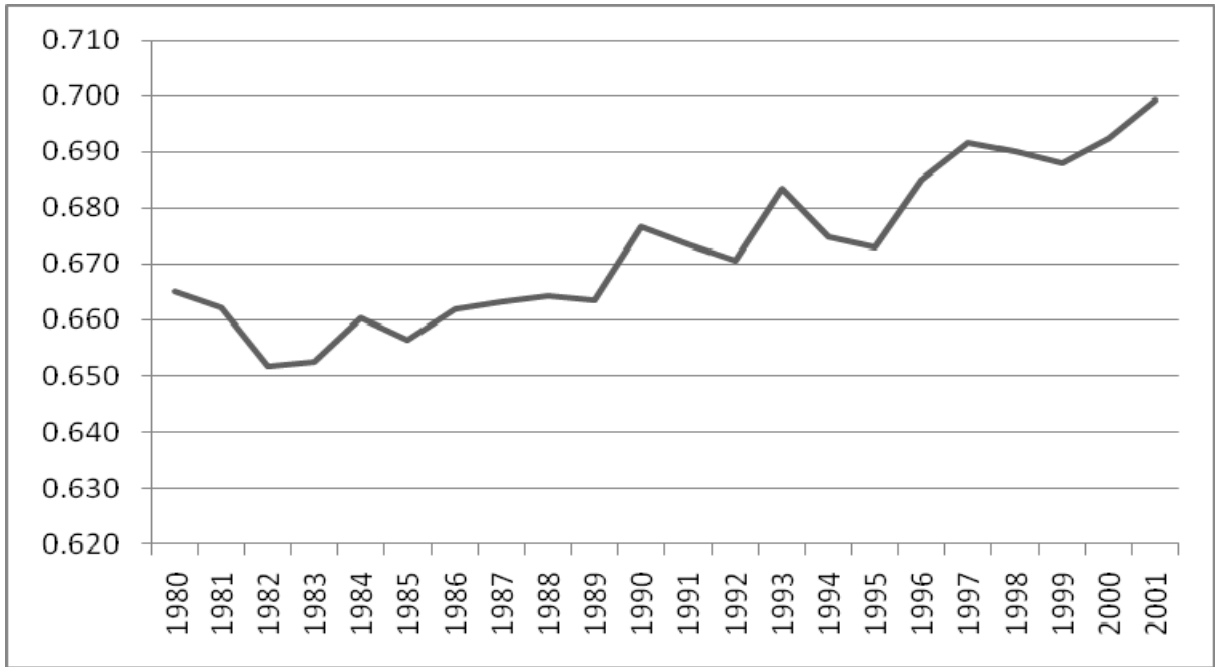


**Figure A4**: Government centralization at the cantonal level of over time

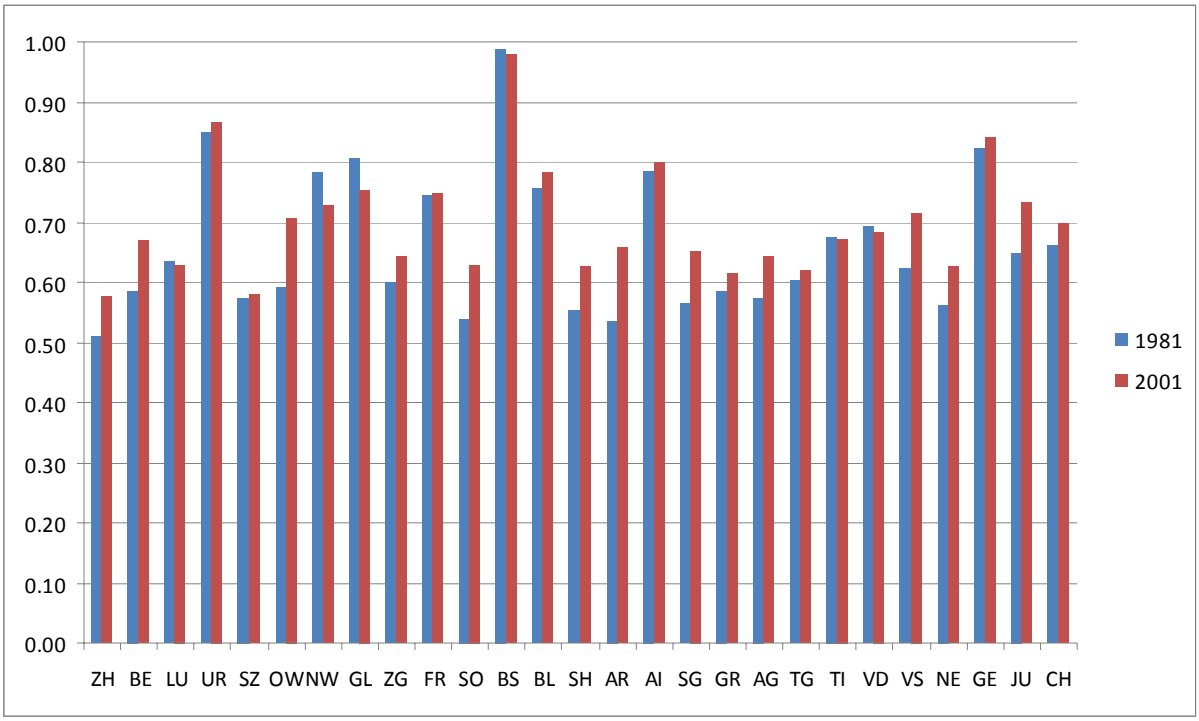



**Figure A5**: Boxplot Reporting the Variation Between 1981 and 2001

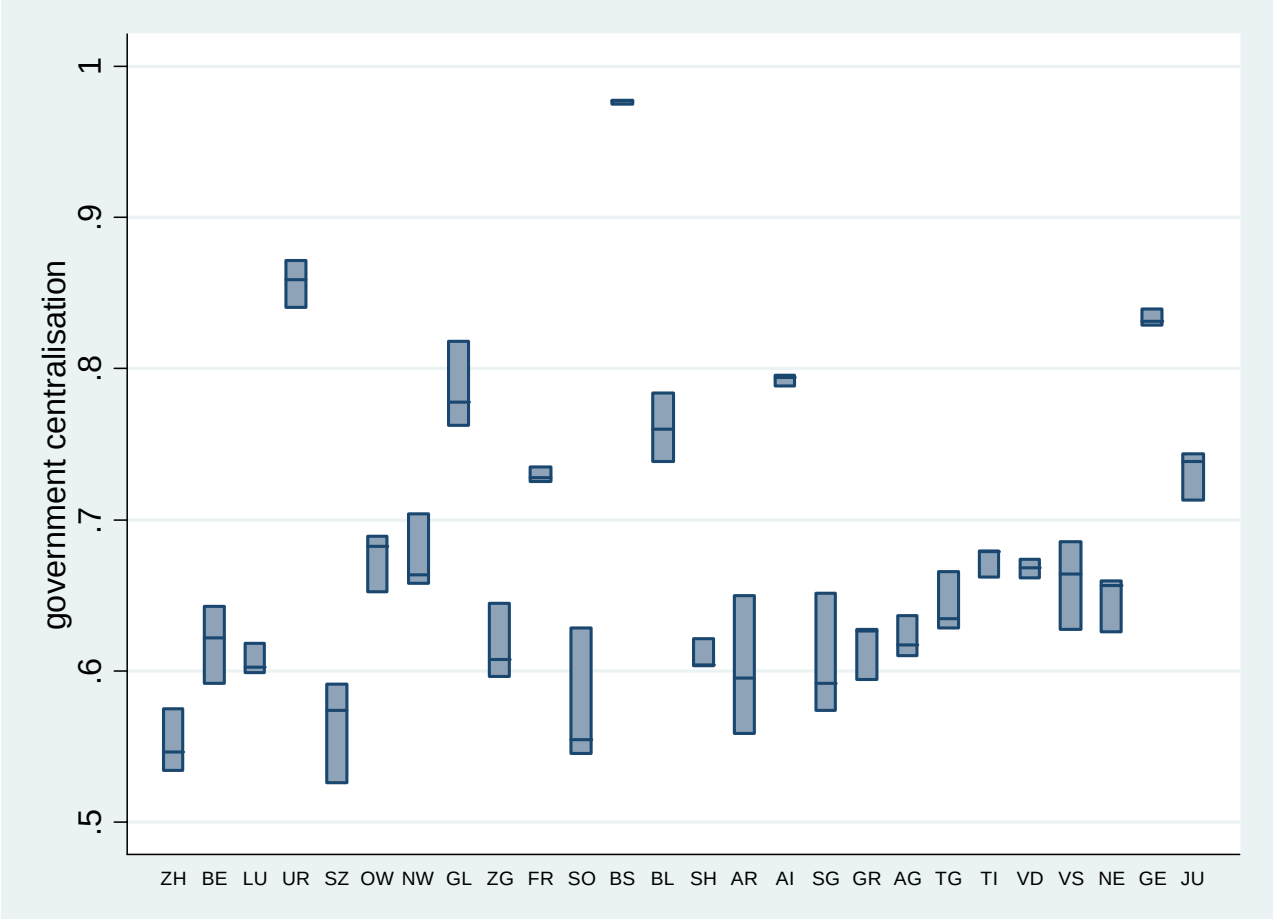


**Figure A6** Development of direct democracy over time in Switzerland (Frey-Stutzer-Index)

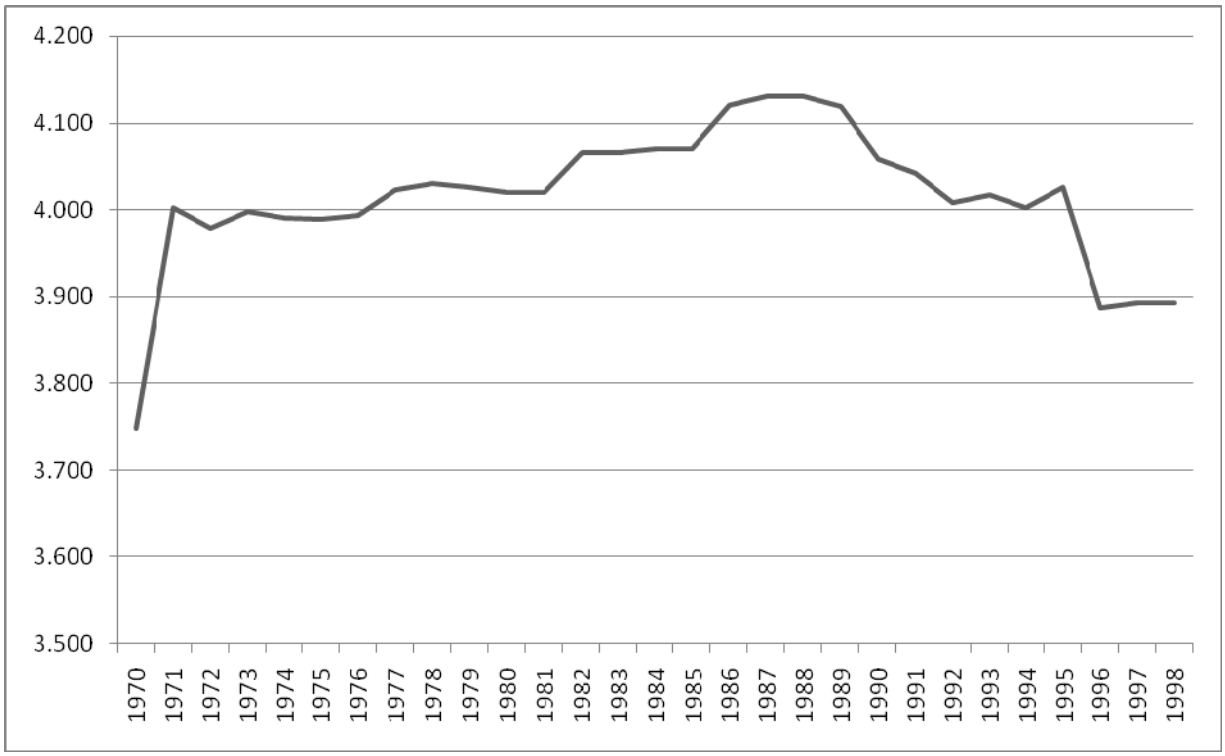
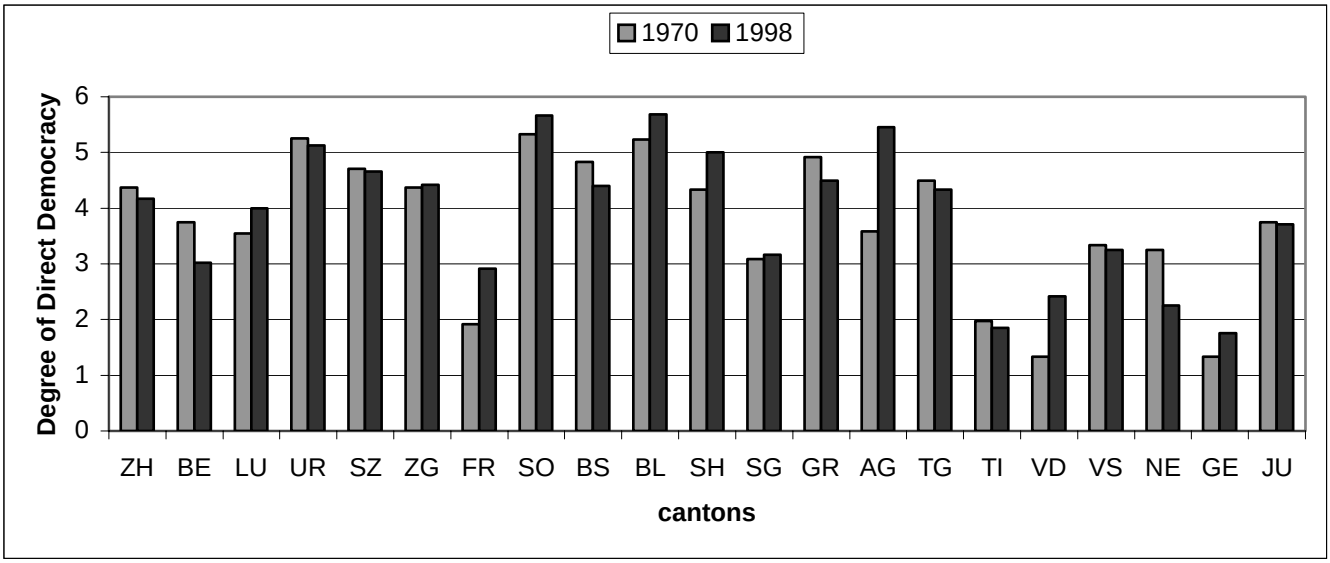



**Figure A7** Degree of Direct Democracy Between 1970 and 1998 at the Cantonal Level




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.