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Time Preferences and Environmental Concern

An Analysis of the Swiss ISSP 2010

Abstract: *This study analyzes the trend of environmental concern in Switzerland using data from the International Social Survey Program (ISSP) 1993, 2000, and 2010. First, we compare the observed trend with indicators of the intensity of public debate regarding the environment. The results show that both the number of articles dealing with environmental issues in print newspapers and the debates in the Swiss parliament strongly increased during the observed period. The ecological awareness of the population, however, remained constant over this time. Second, we scrutinize the "social basis" of environmental concern paying particular attention to individuals' time preferences. Third, we investigate the relationship between environmental concern and proenvironmental behavior, on the one hand, and the relation of concern and the acceptance of governmental regulations, on the other hand.*

In 2010 the International Social Survey Program (ISSP) repeated the module on environmental attitudes for the third time, following earlier surveys in 1993 and 2000. The new data offer the opportunity to analyze the trend in environmental attitudes for a number of countries over roughly the past twenty years. While we have analyzed the trends for all countries of the ISSP elsewhere (see Franzen and Vogl 2013a [in press]), we focus in this article on developments in a single

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country—Switzerland. Concentrating on one country has several advantages. First, we expect that general environmental concerns should have increased in Switzerland as in other countries during the past twenty years. This expectation is based on the observation that major environmental threats have increased, particularly the worldwide emission of carbon dioxide (see IPCC 2007). Moreover, in the past two decades a number of environmental disasters have occurred, receiving much public attention. Examples include the heat wave in summer 2003 in Europe and the explosion of the drilling rig *Deepwater Horizon* in the Gulf of Mexico in 2010. Most recently, the nuclear disaster in Fukushima, Japan, in March 2011 reinforced political debates in many European countries about shutting nuclear power plants and shifting to proenvironmental forms of energy production. Switzerland is one of the few countries within the ISSP in which the third module was conducted in summer 2011 after Fukushima. This allows us to assess the consequences of the Fukushima catastrophe on environmental attitudes in Switzerland.

Second, concentrating on Switzerland allows us to test our assumption that media coverage of global environmental events has increased; the worsening of environmental problems can only influence public opinion if these events and developments are reported in the media. However, it is a mere assumption that media coverage has increased during the past two decades, and this assumption has to be tested. In principal, investigations of media coverage can be conducted for many countries; however, a rigorous analysis of media trends is cumbersome and depends on proper data sources. Such data are available for Switzerland and the country offers a good opportunity to compare media trends with the trends we find through survey data.

The new ISSP data for Switzerland also offer a third advantage. Former research has found a number of sociodemographic variables that explain individual differences in levels of environmental concern. Thus, younger and better-educated people have higher levels of environmental concern, and gender as well as income are found to be related to proenvironmental attitudes (Diekmann et al. 2008; Dietz, Stern, and Guagnano 1998; Franzen and Meyer 2010; Franzen and Vogl 2011; Greenbaum 1995; Stern and Dietz 1994; Van Liere and Dunlap 1980). However, individuals also have different time preferences (Frederick, Loewenstein, and O'Donoghue 2002) and we expect these to be related to environmental concern. We assume that individuals with a higher evaluation of future events, or lower discount rates, also care more about the future quality of the environment. The authors of this article were involved in the construction of the Swiss ISSP questionnaire and incorporated a measure of time preferences into the survey; hence, the Swiss data allow us to test the influence of time preferences and, therefore, to introduce a novel aspect in analyzing individual differences in environmental concern.

Assessments of environmental concern are important because concern should influence individuals' proenvironmental behavior. However, we expect that the relationship between actual behavior and environmental concern is weak because the environment is a public good and rational individuals have an incentive to

defect (Axelrod 1994; Diekmann and Preisendörfer 2001; Franzen 1995). Having said this, the relationship of environmental concern and the acceptance of environmentally friendly policies is expected to be stronger. We test both assumptions with the new data set.

Environmental Concern in Switzerland Since 1993

Environmental concern is typically defined as the *awareness* that humans endanger the natural state of the environment combined with the *willingness* to contribute to solving environmental problems. This definition conforms to a widely accepted formulation, for example, by the German Advisory Council on the Environment (1978) or to similar formulations by Dunlap and Jones (2002). The definition consists of two components, first a cognitive or rational insight that humans endanger the environment, and second a conative component indicating a willingness to solve these problems. Often a third component is added, indicating an emotional concern regarding environmental degradation. Accordingly, environmental concern is a latent variable measured by using multiple items (Maloney and Ward 1973; Maloney, Ward, and Braucht 1975; Preisendörfer and Franzen 1996). Former analyses with the ISSP 1993 and 2000 identified a set of nine items loading on each of the three components (see Franzen and Meyer 2010).¹ Table 1 shows the nine items and the proportions of respondents who agree/disagree strongly or very strongly with each item in 1993, 2000, and 2010.²

Inspection of Table 1 indicates that environmental concern has slightly decreased in the past twenty years in Switzerland. The willingness to pay higher prices in order to protect the environment (items 1 through 3) decreased slightly between 1993 and 2011. Most other items in Table 1 also indicate that environmental concern decreased over this period. There are only two exceptions to this pattern: in 2011 more respondents disagreed with the statement that modern science will solve the problem (item 4) as compared to 1993, and also a slightly higher proportion disagreed with the statement that it is too difficult for them to do something for the environment (item 9). To get a clearer picture of the overall development, we summed up all items (the original index ranges from 9 to 45) and standardized the index to range between 0 and 100. This standardized index decreased slightly from 63.2 in 1993 to 60.2 in 2011, indicating a slight decrease in environmental concern.

Next, we applied an exploratory factor analysis (principal component analysis with varimax rotation) to the items in Table 1. This analysis indicates that the items fall into three groups. The first factor (items 1 through 3) denotes the conative component and explains 23 percent of the variance of the three items. The second factor (items 4 to 7) comprises, on one hand, two items that denote emotional concern (items 5 and 6) and, on the other hand, items that refer to cognitive aspects (items 4 and 7). This factor explains 19 percent of the variance. The third factor contains items 8 and 9 and explains 14 percent of the variance.³ The reliabilities (Cronbach's alpha) of the three components are 0.76, 0.51, and 0.35, respectively. Since the

Table 1

Environmental Concern in Switzerland

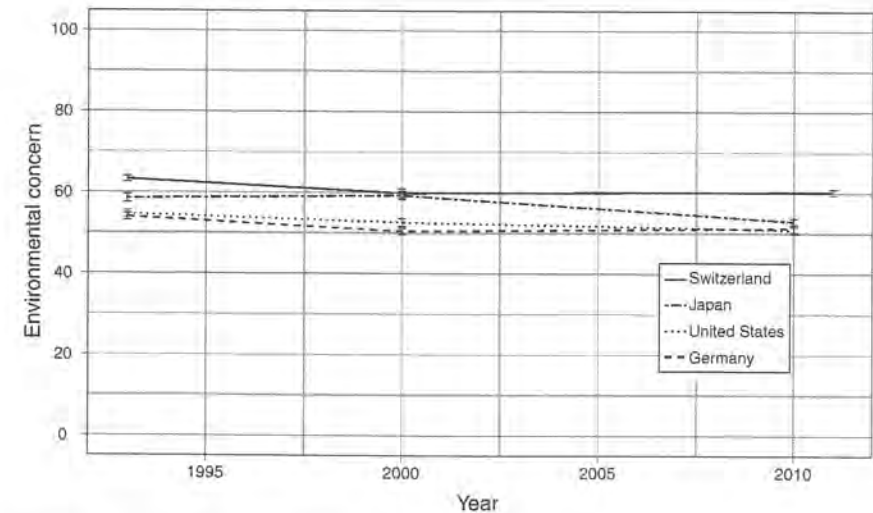
	1993	2000	2011
1 How willing would you be to accept cuts in your standard of living in order to protect the environment? (% very and fairly willing)	69.2	57.2	63.8
2 How willing would you be to pay much higher prices in order to protect the environment? (% very and fairly willing)	59.7	54.7	56.8
3 How willing would you be to pay much higher taxes in order to protect the environment? (% very and fairly willing)	44.1	33.5	39.6
4 Modern science will solve our environmental problems with little change to our way of living. (% strong and fairly strong disagreement)	54.6	52.4	64.9
5 People worry too much about human progress harming the environment. (% strong and fairly strong disagreement)	56.0	57.4	51.1
6 We worry too much about the future of the environment and not enough about prices and jobs. (% strong and fairly strong disagreement)	54.0	54.1	50.0
7 In order to protect the environment the country needs economic growth. (% strong and fairly strong disagreement)	51.4	44.4	50.5
8 I do what is right for the environment, even when it costs more money or takes more time. (% very and fairly willing)	77.7	75.2	67.9
9 It is just too difficult for someone like me to do much about the environment (% strong and fairly strong disagreement)	66.3	67.5	68.5
Index-value of all 9 items (value range from 0 to 100)	63.2	59.9	60.2

Source: Authors' analysis based on data from ISSP 1993, 2000, and 2010.

reliabilities of the second and third components are very low, we decided not to use them as separate indicators. Instead, we start the analyses by using an index of all nine items. This overall index conforms better to the definition of environmental concern, and therefore has better content validity, and a satisfactory reliability of 0.66. However, some results become more evident when we restrict the measurement to the first component as will become evident in the next section.

In comparison with the thirty-three countries included in the ISSP 2010, Switzerland is the country with the highest levels of environmental concern as measured

Figure 1. Trends of Environmental Concern in Switzerland, Japan, the United States, and Germany



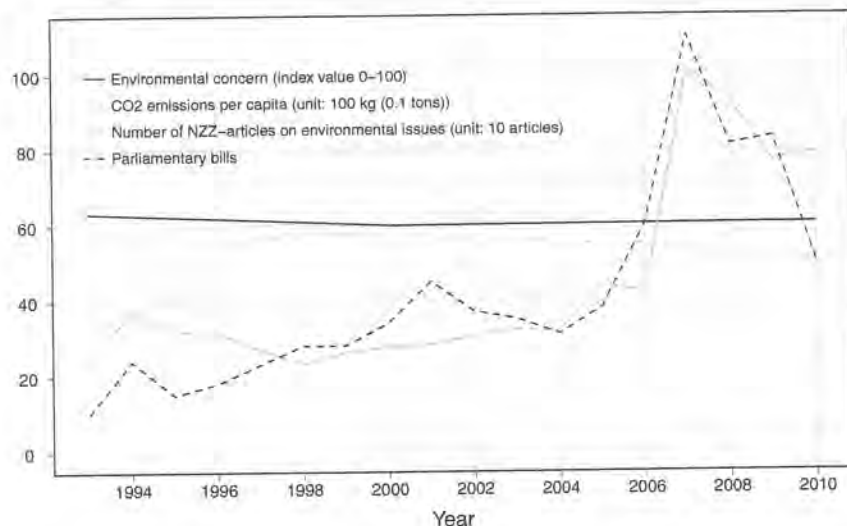
Source: Data are from the ISSP 1993, 2000, and 2010.

Notes: Environmental concern is an index of nine items shown in Table 1 (value range from 0 to 100). The lines at each measurement year include the 95 percent confidence intervals.

by this overall index (see Franzen and Vogl 2013a). Figure 1 additionally shows the trend for the United States, Japan, and Germany. The figure illustrates that in Switzerland environmental concern is always higher than in any of the three other countries. Japan has lower levels of environmental concern but is still significantly higher than Germany and the United States. Interestingly enough, all four countries show the same pattern: There is a slight decline in environmental concern in each country over the past twenty years. Figure 1 demonstrates that Switzerland does not seem to be an exception but shows a very typical trend among the industrialized countries contained in the ISSP.

Given that important global environmental problems have increased in intensity, particularly the issue of global carbon dioxide emissions, and that the warnings of the Intergovernmental Panel on Climate Change (IPCC) have also increased, it is surprising and counterintuitive that the level of public environmental concern has not increased simultaneously. One possible explanation could be that contrary to our assumption, there has not been any increase in the public debate on environmental topics. To test this assumption, we analyzed two indicators. The first is the number of articles dealing with environmental issues in the *Neue Zürcher Zeitung* (NZZ), which is the largest national newspaper in Switzerland. Since 1993 all NZZ articles are stored in a central database (called Factiva). We searched for the three

Figure 2. Trends of Public Debates Related to Environmental Topics in Switzerland



Sources: Dow Jones, Factiva, 2012; available at www.global.factiva.com (accessed April 1, 2012); Politools, Smartmonitor, the Swiss Legislative Database, 2012; available at www.smartmonitor-database.ch (accessed April 1, 2012); as well as authors' calculations based on data from Federal Statistical Office (FSO), Swiss Population Statistics, 2012; available at www.bfs.admin.ch/ (accessed April 1, 2012); and from the Federal Office for the Environment (FOEN), Greenhouse Gas Emissions in Switzerland, 2012; available at www.bafu.admin.ch/klima/09570/ (accessed April 1, 2012).

key words: "environmental protection," "climate change," and "CO₂," and counted the number of articles appearing each year in the NZZ that contain one of the three key words (see Figure 2).⁴ From 1993 to 2003 we counted on average about 300 articles per year in the NZZ. Until 2007 only a minor rise is observable; however, after 2007 the number of articles increased drastically to almost 1,000 per year and remained on a high level thereafter. In May 2007 the Thirteenth United Nations Climate Change Conference took place in Bali with the aim of negotiating a subsequent agreement to the Kyoto Protocol that expired in 2012. Prior to this event the IPCC published its fourth assessment report on climate change. These two events and also the following United Nations Climate Change Conferences in Copenhagen (2009), Cancun (2010), and Durban (2011) increased media interest in environmental topics, especially those concerned with climate change.

As a second indicator, we conducted a content analysis of all debates in the Swiss National Parliament.⁵ The trend of the number of discussions on environmental issues is depicted in Figure 2. As can be seen, the number of bills discussed on environmental topics has increased significantly during the past twenty years.

In the early 1990s, the National Council discussed about twenty bills per year related to environmental issues (e.g., new bills or revisions of bills). This number rose to 110 in 2007, followed by a decrease to fifty in 2010. Thus, the trends in NZZ articles as well as in parliamentary initiatives indicate a significant increase of interest in environmental issues. However, public opinion on the environment did not follow this trend. There are several possible reasons for this discrepancy. On one hand, two severe economic crises dominated public debates between 2008 and 2011 and competed with environmental topics: the banking crisis in the United States and the ongoing fiscal crisis in many European countries. On the other hand, we can observe an increased skepticism in the public regarding the scientific results published by the IPCC, mostly questioning that global climate change is due to human-caused greenhouse gas emissions. Both could be reasons why environmental concern did not increase and did not follow the media trend.

The fourth trend in Figure 2 illustrates the development of per capita CO₂ emissions in Switzerland. The CO₂ emissions decreased from 5.8 tons in 1993 to 5.0 tons in 2010. Hence, in international comparisons Switzerland has not only a very high level of environmental concern but also very low CO₂ emissions. One reason is that Switzerland has had an environmentally friendly policy for decades and also, due to its geographic location in the Alps, there has been a focus on renewable energy, especially hydropower. Another reason is high investments in public transportation leading to a higher demand for public transportation (Franzen and Vogl 2010). Finally, compared to Germany, Japan, and the United States, Switzerland's economy is not based on heavy industry but mostly on less CO₂-intense sectors such as financial services (banking and insurance) or tourism.

Relationship Between Environmental Concern, Values, and Sociodemographic Factors

Besides the descriptive analysis of the ISSP data, next we conducted regression analysis to show the relationship between respondents' level of environmental concern, attitudes, and sociodemographic factors. Previous research claims that older people have lower levels of environmental concern than younger people. The reason could be either a cohort effect or an age effect. A more plausible explanation seems to be a cohort effect. Compared to older people, younger people would be expected to have a higher level of environmental concern because they have been more exposed to debates on environmental topics in the media during their socialization. Education would also be expected to be positively related to environmental concern. Respondents with a higher level of education should better understand the scientific reasons for environmental change and, therefore, would be expected to develop a higher level of environmental concern. There is also evidence of an income effect (Kemmelmeyer, Król, and Kim 2002; Franzen and Meyer 2010); richer people would be expected to have higher levels of environmental concern. The reason is that more affluent households have a lower budget restriction and therefore

a higher willingness to pay for public goods than less affluent households, who give higher priority to economic problems than environmental problems (Franzen and Vogl 2013b). Finally, a gender effect is also mentioned in the literature. Some studies show that women have a higher level of environmental concern (Blocker and Eckberg 1997; Bord and O'Connor 1997; Davidson and Freudenburg 1996; Wilson, Daly, and Gordon 1996; Zelezny, Chua, and Aldrich 2000). In Switzerland there are also regional differences (Diekmann and Franzen 1997). Analyses with the ISSP 1993 show that people from the Italian- and French-speaking parts of Switzerland have a lower level of environmental concern than people from the German-speaking part. However, a recent study by Diekmann et al. (2008) concludes that the environmental gap between the regions has declined.

As a new aspect in our research we include time preferences as a potential factor influencing environmental attitudes. Time preferences can differ depending on how individuals weight future events or payoffs compared to present payoffs. According to Paul Samuelson (1937) time preferences can be described as a discount rate or a discount factor. The utility of future consumption is weighted by a discount factor $D(k) = 1/(1+p)^k$. K denotes the number of time periods until consumption or payoff will happen, and p is the discount rate. On capital markets, p can be interpreted as the interest rate a saver receives for abstaining from consumption. Regarding environmental concern, we expect that higher discount rates (a lower discount factor) cause lower environmental concern. The explanation is that environmental protection will improve the environment only in the long run. Individuals who are impatient and more strongly devalue future payoffs should therefore be less willing to forgo present consumption for the sake of future well-being. Therefore, more environmentally aware people would be expected to have a lower discount rate (higher discount factor).

Empirical studies investigating and measuring time preferences usually find much higher discount rates than the actual interest rates on capital markets. Frederick, Loewenstein, and O'Donoghue (2002) discuss several reasons for the skewed distribution of discount rates. Most studies measure discount rates by individuals' choices between instant and future payoffs. For instance, if someone prefers an instant payoff of 100 monetary units compared to a payoff of 200 monetary units in one year, this person has a discount rate of at least 100 percent. There are several reasons for a skewed time preference. First, monetary payoffs could be subject to diminishing marginal utility (concave utility function). Second, payoffs in the future are uncertain events. Since there is a risk that future payoffs will not take place, people could include an additional risk premium. Third, money devalues over time and the assumed inflation rate is taken into account. Furthermore, people could also assume an increase in their personal wealth and therefore value future payoffs less. Finally, some studies point out that individuals apply different discount rates to different goods; for example, chocolate could have a discount rate different from money or other goods.

Despite the above-mentioned difficulties, time preferences in the Swiss ISSP 2010 are measured by asking respondents two questions. First, respondents read the question: "Assume that the Federal Tax Administration needs to refund you 1,000 Swiss francs (approximately, US\$1,000) and offers you two payout options: you can receive 1,000 Swiss francs immediately, or you can receive 50 francs more if you wait for one year, so you receive 1,050 francs in total. What would you choose?" Respondents who chose the immediate payoff of 1,000 francs were asked a second question: "What is the minimum amount you need to receive in order to choose the payout in one year?" Forty-one percent of all respondents chose the payoff of 1,050 francs in one year and therefore have a discount rate of 5 percent or less. The remaining 59 percent were asked the second question of the minimum payoff in one year. These respondents' discount rates vary between 5.1 percent and 400 percent (five times the amount of 1,000 francs). The mean is 23 percent, which is a quite moderate value compared to other studies (Frederick, Loewenstein, and O'Donoghue 2002).

Meyer and Liebe (2010) report a discount rate of 65 percent in their study with data from the Swiss Environmental Survey 2007. In this survey, respondents could choose between different options. First, they were asked if they wanted 1,000 francs immediately or 2,000 francs in one year. Respondents who chose 2,000 francs could choose again between 1,000 francs and 1,500 francs. The higher value was reduced until 1,000 francs was chosen. Moreover, the survey was combined with a lottery and three respondents received a real payoff of the chosen amount of money (either an immediate payoff or the payoff in one year).

Our study results differ from those of Meyer and Liebe (2010) for two reasons. First, we purposely chose the Swiss tax administration as a hypothetical payoff institution because it is a highly reliable institution and this was expected to decrease the perceived risk of not receiving the payoff in one year; the perceived high reliability obviously reduces individuals' risk premium. Second, in Meyer and Liebe (2010), the first choice (between 1,000 and 2,000 francs) sets a high starting value signaling high discount rates. In our measurement we set quite a low value (1,050 francs instead of 2,000 francs) indicating a lower discount rate. Our lower value seems more realistic, being similar to conventional discount rates paid on financial markets. However, in our analysis the aim is to compare individuals' levels of environmental concern by comparing individuals with lower and higher discount rates and not to describe a perfectly realistic discount rate.

Besides time preferences, our analysis also includes two variables that are often explanatory factors of environmental concern. The first variable is Inglehart's (1990, 1995, 1997) postmaterialism index. The second variable is trust in other people. In the ISSP, postmaterialism is measured by asking respondents for their first and second priority out of four political goals (fight against rising prices, maintain order in Switzerland, give people more say in governmental decisions, and freedom of speech). The index ranges from 0 to 2 depending on the number

of postmaterialistic values chosen. According to Inglehart, environmental protection is a postmaterialistic goal, and the index should thus be positively related to environmental concern.

Trust in people is measured with two variables in the ISSP. Respondents were asked "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?" and "Generally speaking, do you think that most people would try to take advantage of you if they got the chance, or would they try to be fair?" Both variables have five-point answering scales (see Appendix Table A1), a correlation of 0.5, and can be added to a composite index (one dimension). People with greater trust in others would be expected to have a greater willingness to contribute to public goods than people who trust less, because less-trusting people assume that no one else is contributing either. The trust variable measures the willingness to cooperate and should be positively correlated with environmental concern.

We test the different effects simultaneously using multiple regression analysis (see Table 2). In Model 1, we test the effects of the explanatory factors on the index of environmental concern as described in Table 1. As can be seen from the results, all sociodemographic variables have the expected relationship and replicate previous findings. Female respondents, individuals with higher education, and more affluent respondents have a higher level of environmental concern compared to males, less educated, and less wealthy people. We find no effects for age, work status, and children in the household. Postmaterialism and trust in people show the expected positive relationships. Similarly to previous results with the ISSP 1993, people living in the German-speaking part of Switzerland also have a higher level of environmental concern; however, there is no difference between residing in an urban or rural area of Switzerland.

A new result is the expected negative effect of time preferences.⁶ The effect is statistically significant but small compared to other variables. According to our analysis, an increase in individuals' discount rate of 100 percent decreases environmental concern by only 2.2 units. In comparison, an additional year of education (ranging from 9 to 17.5 years) increases environmental concern by almost one unit (0.92).

Next, we test the robustness of the effect of discount rates. The effect in Model 1 is due to nine observations that have discount rates of 400 percent. If we run a model without these nine observations, the value and the sign remain the same but the *t*-value decreases and the coefficient is no longer statistically significant at the 5 percent level. Thus, the results are not robust because they depend on a small number of observations with high discount rates and low levels of environmental concern. A sample of respondents with a discount rate of 100 percent or less would be more realistic. However, restricting the sample to such a subsample no longer shows any significant effects. But if we reduce the environmental concern index to a subset of the three willingness-to-pay items, the effect is statistically significant (see Model 2 in Table 2). A change in the discount rate from 5 percent to 100 percent

Table 2

Explanatory Factors of Environmental Concern

	Environmental concern (Model 1)	Willingness to pay (Model 2)	Willingness to pay (Model 3)
Sex (1 = female)	3.085*** (0.895)	4.379** (1.563)	3.781** (1.439)
Age (18–80)	–0.0496 (0.0289)	–0.0426 (0.0502)	–0.0486 (0.0479)
Employment status (1 = in paid work)	0.930 (1.065)	1.774 (1.855)	1.053 (1.746)
Years of education	0.922*** (0.183)	1.562*** (0.320)	1.465*** (0.294)
Individual income (CHF1,000)	0.392* (0.194)	0.486 (0.337)	0.643* (0.314)
Children in household (1 = yes)	–0.166 (0.960)	–0.235 (1.661)	–0.625 (1.578)
Postmaterialism	1.862** (0.691)	1.886 (1.201)	1.622 (1.146)
Trust	1.849*** (0.240)	2.154*** (0.419)	1.958*** (0.396)
Discount rate	–2.222* (0.916)	–5.927* (3.112)	
Discount rate, dummy (1 = discount rate > 5%)			–4.306** (1.369)
Living in urban area (ref.: rural area)	0.0224 (0.841)	–0.134 (1.458)	–0.480 (1.369)
Region (ref.: Swiss-German)			
Swiss-French	–2.159* (1.021)	–4.415* (1.769)	–4.927** (1.627)
Swiss-Italian (Tessin)	–1.512 (2.903)	–1.373 (5.000)	–6.522 (4.167)
Constant	34.92*** (2.864)	21.43*** (5.060)	25.85*** (4.782)
Adj. <i>R</i> ²	0.20	0.13	0.14
<i>N</i>	742	731	831

Notes: Ordinary least squares regressions with nonstandardized coefficients. Standard errors are in parentheses. **p* < 0.1; ***p* < 0.05; ****p* < 0.01; *****p* < 0.001.

reduces the willingness-to-pay index (ranging from 0 to 100) by about 6 units. This effect is statistically significant at the 10 percent level (t -value = 1.90) and becomes significant at the 5 percent level (t -value = 2.08) if not the individual but rather the household income per capita is used. The effects of all other variables remain constant, and postmaterialism has no significant effect on people's willingness to pay.

We also conducted another robustness test. In Model 3, the discount rate is a dichotomized variable and no longer restricted to the 100 percent threshold value. People who have chosen 1,050 francs are labeled as the reference category, and all other respondents with higher values are coded as 1. The results show that respondents with high discount rates have a reduced willingness-to-pay of 4.3 units. The effect is statistically significant at the 1 percent level (t -value = 3.14).

Relationship Between Attitudes, Behavior, and Acceptance of Environmental Policies

The ISSP also contains respondents' responses with respect to environmental behavior and the acceptance of environmentally friendly policies. Therefore, we can also examine the causes of environmental behavior and acceptance of policies. We expect only a weak relationship between environmental attitudes and environmentally friendly behavior (Derksen and Gartrell 1993; Diekmann and Preisendörfer 1998). The reason for this is that the environment is a public good and there is no incentive for rational individuals to act proenvironmentally, even for those with high levels of environmental concern. Rational individuals have to assume that their behavior alone cannot solve environmental problems. This is not only true for global problems such as climate change but also for local problems such as keeping a public city garden. Because individuals have no incentive to contribute to public goods, the state or public institutions must provide such incentives or the public goods themselves.

However, rational individuals have more reason to support environmentally friendly policies (Franzen 1997). Participating in elections is irrational because one individual vote is not decisive and contributes almost nothing to the outcome. However, the costs of participating in elections are very low. Hence, already low social incentives such as support or encouragement from one's social network are sufficient to motivate individuals to participate in elections. Also, the cost of an implemented policy measure is shared by everyone and therefore effective as compared to voluntary individual action. Thus, individuals who express their willingness to improve the environment would be expected to accept environmentally friendly policies. Different policies can be classified into two groups: those referring to law and order and those referring to market-compatible mechanisms (Sinn 2012). Environmental concern does not predict which kind of policies will be supported, but generally speaking, support for environmentally friendly policies should be highly correlated with concern.

In the ISSP, individuals' environmental behavior is measured using six items as

Table 3

Environmentally Friendly Behavior

		Reported frequencies	
1	How often do you make a special effort to sort glass or tins or plastic or newspapers and so on for recycling?	Always	78%
		Often	18%
		Sometimes	3%
		Never	1%
2	How often do you make a special effort to buy fruit and vegetables grown without pesticides or chemicals?	Always	20%
		Often	38%
		Sometimes	31%
		Never	11%
3	How often do you reduce the energy or fuel you use at home for environmental reasons?	Always	12%
		Often	43%
		Sometimes	37%
		Never	8%
4	And how often do you choose to save or reuse water for environmental reasons?	Always	11%
		Often	36%
		Sometimes	34%
		Never	19%
5	And how often do you avoid buying certain products for environmental reasons?	Always	11%
		Often	38%
		Sometimes	40%
		Never	11%
6	And how often do you cut back on driving a car for environmental reasons?	Always	9%
		Often	31%
		Sometimes	40%
		Never	20%

Source: Data are from International Social Survey Program (ISSP) 2010.

shown in Table 3. For each question the answer categories are "always," "often," "sometimes," and "never." Obviously, environmentally friendly behavior is not measured in an optimal way. Respondents were not asked about their actual behavior but rather, for example, in questions (1) and (2), how often they make a "special effort" to act in an environmentally friendly way. Hence, the answers depend on individuals' subjective interpretation of their own behavior. In fact, the term to

"make a special effort" does not imply that respondents actually do anything, but only refers to an intention. International coordinated surveys such as the ISSP need questions that can be asked in different countries. Thus, detailed questions on behavior are difficult to construct. For example, in some countries it is not possible to recycle because the necessary infrastructure is missing. Respondents from developing countries would therefore have a systematic disadvantage if compared, for example, to citizens of Switzerland.⁷

Despite these difficulties we analyze respondents' proenvironmental behavior with the measure at hand. In Switzerland, environmentally friendly behavior is high (see Table 3). Seventy-eight percent of all respondents claim to recycle always, and 40 percent say they cut back on driving often or always for environmental reasons. To measure proenvironmental behavior from various aspects (e.g., driving, recycling, shopping), we generate an additive index of the six items displayed in Table 3, assigning code 1 if a respondent answered "always" and 0 otherwise. The resulting index ranges from 0 to 6, and has a mean of 1.45.

The ISSP 2010 also contains only a few questions on the acceptance of some environmental policies. The problem here is similar to the possibility of surveying behavior in an international context. Different countries have different political debates, which makes it difficult to design questions that apply to every participating country. Therefore, we also have to live with suboptimal policy questions (see Table 4). The first question asks whether the government should pass laws in order to protect the environment or whether protecting the environment should be left to individuals' free choice. Similarly, the second question asks whether business should be regulated. In questions 3 and 4, respondents can choose whether they prefer heavy fines, the tax system, or more information and education to induce greater proenvironmental behavior by individuals (question 3) or businesses (question 4). Finally, the last question asks if there should be binding international agreements for Switzerland. Respondents can agree or disagree on a five-point answering scale.

In Switzerland, three-quarters of respondents (77 percent) believe that environmental protection should be regulated by the state and not be left to individual choices. For business, an overwhelming 90 percent believe regulation is the best way to protect the environment. Asking respondents whether they prefer fines or more information, the relative majority (43 percent) prefers tax regulation for people or families (53 percent for businesses), and only 36 percent prefer more information (21 percent for businesses). There is also broad agreement in regard to international agreements in Switzerland (53 percent of respondents agree and 38 percent strongly agree). We built an index to analyze the relationship between environmental concern and acceptance of environmental regulation. We added up the number of answers in which respondents claim to prefer state regulation to individual choices and coded them as 1. The additive index ranges from 0 to 5 and has a mean of 3.5.

Table 5 shows the results of OLS regressions with environmental concern as the independent variable and proenvironmental behavior or acceptance of environmentally

Table 4

Acceptance of Environmentally Friendly Policies

	Agreement
1a Government should let ordinary people decide for themselves how to protect the environment, even if it means they don't always do the right thing.	23%
1b Government should pass laws to make ordinary people protect the environment, even if it interferes with people's rights to make their own decisions.	77%
2a Government should let businesses decide for themselves how to protect the environment, even if it means they don't always do the right thing.	10%
2b Government should pass laws to make businesses protect the environment, even if it interferes with businesses' rights to make their own decisions.	90%
3 Which of these approaches do you think would be the best way of getting business and industry in Switzerland to protect the environment?	
(a) Heavy fines for businesses that damage the environment	26%
(b) Use the tax system to reward businesses that protect the environment	53%
(c) More information and education for businesses on the advantages of protecting the environment	21%
4 Which of these approaches do you think would be the best way of getting people and their families in Switzerland to protect the environment?	
(a) Heavy fines for people who damage the environment	21%
(b) Use the tax system to reward people who protect the environment	43%
(c) More information and education for people on the advantages of protecting the environment	36%
5 For environmental problems, there should be international agreements that Switzerland and other countries should be made to follow.	
Agree strongly	38%
Agree	53%
Neither agree nor disagree	6%
Disagree	2%
Disagree strongly	1%

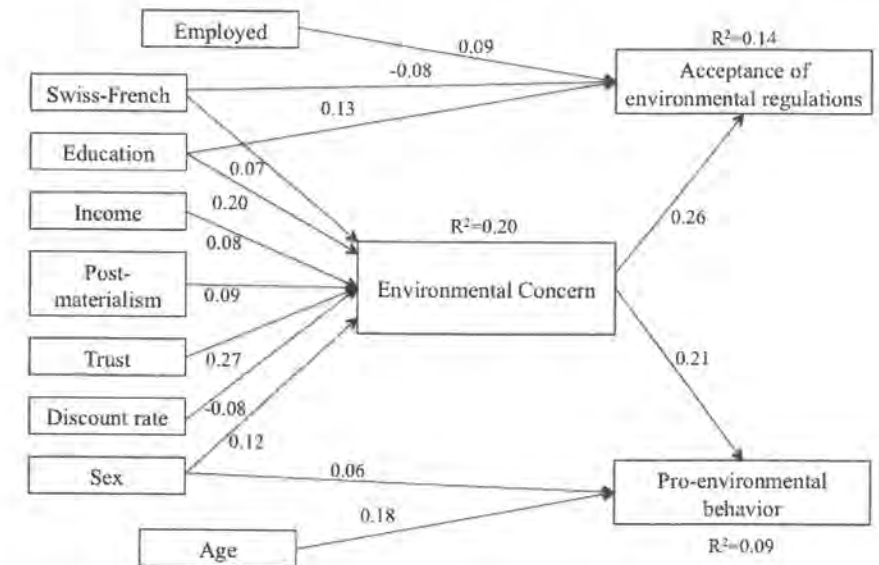
Source: Data are from International Social Survey Program (ISSP) 2010.

Table 5

Regression Analysis of Environmental Concern, Proenvironmental Behavior, and Acceptance of Environmental Regulation

	Environmental concern	Acceptance	Behavior
Environmental concern (index value)		0.0269*** (0.00406)	0.0202*** (0.00404)
Sex (1 = female)	3.085*** (0.895)	-0.147 (0.0986)	0.198* (0.100)
Age (18-80)	-0.0496 (0.0289)	0.00589 (0.00318)	0.0136*** (0.00333)
Employment status (1 = in paid work)	0.930 (1.065)	0.255* (0.116)	-0.185 (0.120)
Years of education	0.922*** (0.183)	0.0659** (0.0205)	0.00208 (0.0209)
Individual income (CHF1,000)	0.392* (0.194)	0.00643 (0.0213)	0.00627 (0.0212)
Children in household (1 = yes)	-0.166 (0.960)	0.0766 (0.106)	-0.0275 (0.104)
Postmaterialism	1.862** (0.691)	-0.131 (0.0769)	-0.0526 (0.0766)
Trust	1.849*** (0.240)	-0.00691 (0.0273)	0.0267 (0.0274)
Discount rate	-2.222* (0.916)	0.0476 (0.100)	0.121 (0.107)
Living in urban area (ref.: rural area)	0.0224 (0.841)	0.212* (0.0923)	-0.130 (0.0939)
Region (ref.: Swiss-German)			
Swiss-French	-2.159* (1.021)	-0.249* (0.112)	0.161 (0.111)
Swiss-Italian (Tessin)	-1.512 (2.903)	-0.522 (0.312)	0.248 (0.320)
Constant	34.92*** (2.864)	0.707* (0.347)	-0.719* (0.358)
Adj. R^2	0.20	0.14	0.09
N	742	711	646

Notes: Ordinary least squares regressions with nonstandardized coefficients. Standard errors are in parentheses. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Figure 3. Relationship Between Environmental Concern, Proenvironmental Behavior, and Acceptance of Environmental Regulation

Notes: The figure depicts standardized regression coefficients from three different regression analyses (see Table 5). Only statistically significant coefficients at the 5 percent significance level are shown. The correlations among the exogenous variables are displayed in Table A2 in the Appendix.

friendly policies as the dependent variable (we also included Model 1 from Table 2 in the first column). In Figure 3, we display the results to depict the relationships more clearly. As already shown in Table 2, many sociodemographic variables are related to environmental concern. Education and trust in people are the main variables that explain environmental concern. Concerning trust in people, the causal interpretation is not as clear as that with respect to education. But the assumption seems plausible that people first build trust in other people and later develop environmental concern and other values.

Furthermore, Figure 3 shows that environmental concern has the expected positive influence on environmental behavior and also on the acceptance of environmental regulation. Standardized regression coefficients indicate, as expected, that environmental concern has a stronger effect on environmental behavior than on acceptance of environmentally friendly policies.

The differential effect of environmental concern on proenvironmental behavior, on the one hand (standardized regression coefficient of 0.21), and on the acceptance of political regulations, on the other hand (standardized regression coefficient of

0.26) confirms our hypothesis. However, the differences are not very strong. One reason for this could be the low accuracy of the measure for behavior. Note also that the explained variance is higher for environmental concern (20 percent), than for the acceptance of political regulations (14 percent), or for proenvironmental behavior (9 percent), which indicates that the ISSP data are more appropriate for an analysis of environmental concern than for an analysis of proenvironmental behavior.

Figure 3 also reveals that time preferences explain environmental concern but have no influence on behavior or the acceptance of political regulations. This result is not surprising. The significantly positive relationship between environmental concern and time preferences shows that people with lower discount rates care more about future environmental threats. However, this should not mean that respondents with lower discount rates are more in favor of state regulations. In other words, patient individuals can be equally in favor of voluntary actions. There is a similar explanation for the relationship between discount rates and proenvironmental behavior. The problem that it is necessary for all (or most) people to act in an environmentally friendly manner prevents individuals from behaving proenvironmentally regardless of their time preferences. The empirical results are in line with these assumptions and are consistent.

Conclusion

In this study, we present the main findings of the environmental module of the ISSP 2010 for Switzerland. First, we demonstrate that levels of environmental concern have not changed in the past twenty years by comparing the 2011 data with the previous ISSP surveys of 1993 and 2000. Paradoxically, over the same period, environmental issues have received more attention in the media as well as in political debates. Why the increase in media attention is not affecting environmental concern remains unanswered in this study. One possible explanation is that the maximal fraction of individuals who are sensitive to environmental problems had already reached its peak in 1993. Another possibility is that information on climate change published in recent years has been more conflicting than that published previously and that skepticism regarding the reliability of the IPCC has confused the public. The arguments in favor of and against environmental protection and climate change could be balancing each other out, so that the net level of environmental concern remains the same. Furthermore, environmental problems had to compete for attention with the banking crisis that started in 2008 and the subsequent debt crisis in Europe. Moreover, we construct the trend in environmental concern by using only the three measurements in 1993, 2000, and 2010. Hence, we are not able to uncover fluctuations that might have occurred between those measurement points.

Second, the regression analyses confirm that individuals' discount rates influence environmental concern significantly. Individuals with a greater focus on future events (low discount rates) also have more proenvironmental attitudes than

impatient individuals who give more weight to the present. The influence of time preferences holds only for environmental concern, but not with respect to proenvironmental behaviors or the acceptance of environmentally friendly policies.

Third, we examine the relationship between environmental concern and proenvironmental behavior on one side, and environmental concern and acceptance of environmental policies on the other side. The results reveal that environmental concern has only moderate effects on proenvironmental behaviors. The model explains only 9 percent of the variance of proenvironmental behavior. Therefore, attitudes only help slightly to explain proenvironmental behavior. This means that an increase in environmental concern does not necessarily change individuals' behavior. One way to influence behavior is to provide incentives, especially changes in prices. However, the question of how incentives influence behavior cannot be tested using the ISSP data.

Finally, our analyses show that environmental concern has a slightly higher effect on the acceptance of environmental regulations as compared to individual voluntary proenvironmental behavior. However, our model can only explain 14 percent of the variance, which is less than we expected. One reason for this could be the limited number of questions on policy regulations in the ISSP. The questions refer only to preferences for regulations over individual voluntary choices. Other options such as a preference for market-oriented measures such as CO₂ certificates were not surveyed. Furthermore, the options "heavy fines," "taxes," and "information" do not cover other measures for state regulation. This rather general measure could be the reason why this study might underestimate the relationship between environmental concern and acceptance of environmental regulations.

Notes

1. However, there are also other concepts of measuring environmental concern, for example, Marquart-Pyatt (2012).

2. The Swiss survey was conducted from March 7 to November 11, 2011. The survey is a sample of individuals drawn randomly from the sampling register of the Federal Statistical Office (face-to-face interview, CAPI) of people above age eighteen (residing in Switzerland) and questioned in one of the three official languages (German, French, Italian). In total there are 1,212 interviews. The response rate of the random sample is 50.9 percent (AAPOR standard). The data are available from the Swiss Centre of Expertise in the Social Sciences (FORS) (see Dessmontet and Schuler 2012; Ernst Stähli et al. 2012).

3. In contrast to the ISSP 2010, only two factors were extracted in 1993 and 2000. Items 8 and 9 were part of the first factor in 1993 and 2000. However, these differences are only small insofar as the first factor still indicates the willingness to pay whereas the third factor indicates a more general willingness to contribute.

4. The number of articles counted varies according to whether a search is conducted for each key word separately or in combination. However, the trend remains more or less the same if the search is done only for "climate change" or only for "CO₂". In the case of searching only for "environmental protection," no trend is observable. Factiva is owned by Dow Jones and Company (Dow Jones 2012).

5. For the content analysis, we used "Smartmonitor: The Swiss Legislative Database" (Politools 2012). The database contains all bills of the Swiss Parliament since 1993, divided into ten categories. In our analysis, we included (1) government bills, (2) parliament bills, (3) parliamentary initiatives, (4) local state (canton) initiatives, (5) parliamentary motions, and (6) parliamentary postulates. We did not include requests from individual people, which are included in the database as parliamentary interpellation, parliamentary recommendation, parliamentary requests, and questions to the government. In total we analyzed 11,677 bills.

6. Meyer and Liebè (2010) test time preferences only with respect to the willingness to pay. They show an effect for the willingness to pay for private environmental goods at the 10 percent level of significance.

7. For a rather uncritical analysis of environmental behavior in international comparison using the ISSP 2000, see Hadler and Haller (2011).

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Table A1

Variable Description

Independent variable	Min	Max	Mean	SD	N	Variable description
Sex	0	1	0.49		1,212	1 = female, 0 = male
Age	19	80	47.34	16.37	1,162	Age of respondent
Employment status	0	1	0.64		1,210	1 = currently in paid work, 0 = not in paid work
Years of education	6	17.5	12.38	2.77	1,199	Highest degree of education (23 categories) coded in years of education according to guidelines of the Swiss Federal Statistical Office
Individual income (in CHF 1,000)	1.1	9.7	4.71	2.66	936	Respondents' monthly net-income (10 categories) coded at categories' mean
Child in household	0	1	0.26		1,212	1 = own children in household (< age 18); 0 = no children in household
Post-materialism	0	2	0.83	0.59	1,149	Maximal two postmaterialistic categories from a set of four categories
Trust	2	10	6.61	1.81	1,203	Additive index of two trust questions coded from 1 to 5, with 1 meaning distrust and 5 meaning high trust
Discount rate	0.05	6	0.24	0.5	997	Annual interest rate for abstaining from a fictive immediate payoff of 1000 Francs paid by the national tax administration (in 100%)
Discount rate (Dummy)	0	1	0.59		1,140	1 = Discount rate of respondents > 5 percent; 0 = Discount rate of respondents of 5 percent or lower
Living in urban area	0	1	0.42		1,212	1 = Respondents living in an urban area (major city or small town); 0 = Respondents living in a rural area (village or hamlet)
Region:						Reference category Swiss-German
Swiss-French	0	1	0.22		1,212	
Swiss-Italian (Tessin)	0	1	0.03		1,212	

Source: Michèle Ernst Stähli, Dominique Joye, Alexandre Pollien, and Marlène Sapin, MOSAiCH: *Befragung zu Gesundheit, Umwelt und Politik—2011* [MOSAICH: Survey on Health, Environment and Politics—2011]. Data set (Lausanne: Swiss Centre of Expertise in the Social Sciences [FORS], 2012).

Table A2

Correlation Table of Variables Shown in Figure 3

	1	2	3	4	5	6	7	8	9	10	11	12
Environmental behavior	1	1.00										
Acceptance	2	0.14*	1.00									
Env. concern	3	0.20*	0.31*	1.00								
Sex	4	0.09*	-0.10*	0.03	1.00							
Age	5	0.20*	0.03	-0.06	1.00							
Employed	6	-0.14*	0.13*	-0.15*	-0.42*	1.00						
Education	7	0.04	0.24*	-0.20*	-0.02	0.22*	1.00					
Income	8	0.02	0.18*	-0.39*	0.16*	0.27*	0.44*	1.00				
Postmaterialism	9	-0.01	0.02	-0.05	-0.10*	0.09*	0.25*	0.06	1.00			
Trust	10	0.12*	0.14*	0.36*	0.00	0.06	0.25*	0.22*	0.11*	1.00		
Discount rate	11	0.03	-0.05	-0.10*	0.14*	-0.07	-0.02	-0.10*	0.08*	-0.04	1.00	
Swiss-French	12	0.02	-0.09*	-0.11*	0.06	-0.02	0.02	0.00	0.04	-0.13*	0.27*	1.00

Notes: * $p < .05$ or greater, two-tailed. Sample size is based on Model 1, casewise deletion for variables with missing "Environmental behavior" and "Acceptance."

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Examining Gender Differences in Environmental Concern in the Swedish General Public, 1990–2011

Abstract: While numerous cross-sectional studies find modest gender differences in environmental concern within the general publics of North American and European countries, this pattern has not been examined over time—primarily due to a lack of suitable data. Using twenty-two years of nationally representative survey data from the Swedish general public, we test whether the theoretically expected relationship between gender and environmental concern—where women are modestly more proenvironmental than men—is robust over time. Results from our multivariate ordered logistic regression models reveal a consistent pattern over the time period. Across all available years of data, women report greater environmental concern than men in the Swedish general public. Specifically, Swedish women report greater worry about environmental destruction, greater worry about climate change, and greater support for environmental protection than men. Thus, this gender difference in environmental concern is indeed robust. The theoretically expected relationship between gender and environmental concern is robust not only across environmental concern indicators and countries of study but also over time.

A large body of scholarship in the past two decades finds that women in many North American and European countries report moderately stronger environmental concern (i.e., proenvironmental values, attitudes, beliefs, and behaviors) than do men (Bord and O'Connor 1997; Dietz, Dan, and Shwom 2007; Flynn, Slovic, and Mertz 1994; Hunter, Hatch, and Johnson 2004; McCright 2010; Stern and Dietz 1994; Stern, Dietz, and Kalof 1993; Xiao and McCright 2012b; Zelezny, Chua,

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