

TV CHANNELS, SELF-CONTROL AND HAPPINESS

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Abstract: In many countries, TV viewers have access to more and more TV channels. We study whether people can cope with this and watch the amount of TV they find optimal for themselves, or whether they are prone to over-consumption. We find that heavy TV viewers do not benefit, but instead report lower life satisfaction with access to more TV channels. This finding runs counter to the standard economic prediction that a larger choice set does not make people worse off. It suggests that an identifiable group of persons experience a self-control problem when it comes to TV viewing. (98 words)

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1. Introduction

TV viewing is the most important (prevalent ?) leisure time activity in modern societies. Revealed preference therefore suggests that, for many people, TV consumption is a significant source of well-being. This assessment is in contrast to the mixed appraisal of TV viewing in society. Television has been called a ‘plug-in-drug’, keeping people glued to the screen and impeding the enjoyment of more valuable activities. Accordingly, the increase in TV consumption over time has a negative connotation, being associated with a decline in social capital, an increase in violence and crime, and a weakening of democracy.¹ In sum, there is a strong popular notion that people watch too much TV. People are prone to weakness of will when faced with the temptation of TV’s immediate benefits and low immediate costs. They watch more than they would like to watch, both *ex ante* and *ex post*.

This paper empirically studies the claim of systematic errors in TV consumption, based on people’s own *ex post* evaluations. People’s self-reported subjective well-being is analyzed as a new empirical approach in order to discriminate between different theories predicting similar patterns of behavior but differences in individual welfare (Frey and Stutzer 2005; Gruber and Mullainathan 2005). In particular, we (aim to) test whether heavy TV viewers experience reduced individual well-being because of their consumption choice.

We study whether the effect of having a larger number of TV channels available, i.e. a larger choice set, raises people’s subjective well-being, as standard economic theory would predict. The expansion and diversification of media supply, due to VCR, cable or satellite has, in many countries, gone hand in hand with increased TV viewing time (see the collected studies in Becker and Schoenbach 1989). Spending more time in front of the TV set is consistent with rational consumers (optimal viewing time), as well as with TV viewers who are subject to a self-control problem. A study on the introduction of cable TV in Israel (comparing neighborhoods with a difference-in-difference approach) complements the picture by people’s evaluation of their consumption choice (Weimann 1996). It is found that, with cable TV, there is a significant increase in the percentage of viewers agreeing to the statements “I often watch more television than I intend to” (28% before the introduction of cable and 41% one year later) and “watching television is often a waste of time” (24% before the introduction of cable and 36% one year later). The expanded choice set due to technological advance seems to have

¹ The case for negative impacts of TV consumption on society is, e.g., made by Kubey (1996), Putnam (2000), Sparks and Sparks (2002) and Gentzkow (2006).

led to an increase in the number of people watching more TV than planned, or more than they think is good for them.²

While more choice potentially raises individual welfare (if people are able to rationally maximize utility, as is assumed in the traditional economic framework), it is hypothesized here that people with severe self-control problems suffer a utility loss. The positive effect from a potentially better match between TV programs and individual preferences is more than offset by the loss of well-being resulting from over-consumption.

The hypothesis is tested based on a two-step approach. For the empirical analysis, we use recent data from the European Social Survey, World Values Survey and Television Key Facts from IP Network. In the first step, consumers who might have a self-control problem are identified as those people (individuals ?) with a large positive residual in a regression explaining the amount of TV viewing according to individual socio-demographic characteristics (referred to as “*heavy viewers*”). In the second step, the effect of a larger choice of TV channels on subjective well-being is estimated for heavy TV viewers compared to moderate TV viewers. Based on more than 125,000 individual observations from 76 country samples, we find a statistically significant negative interaction term between (residual) TV viewing and the number of TV channels, and calculate a negative marginal effect for additional TV channels on the well-being of heavy viewers. This is consistent with the hypothesis of limited self-control. As we consider our two-step approach a novel way test for limited self-control, we also briefly compare it to alternative approaches.

We discuss and empirically address three alternative explanations for the observed statistical findings. First, we take into account that the measure for the number of TV channels might not be representative for heavy TV viewers and that the degree of being representative might vary systematically across countries. Second, the average negative marginal effect might also reflect some negative net effect from increased market competition that benefits some people while penalizing others, irrespective of heavy TV viewers suffering a self-control problem. In particular, competition between channels is expected to benefit consumers who are valued by advertisers, i.e. young adult viewers and female viewers. Third, the results could be due to a selection effect in the sense that dissatisfied people turn towards TV viewing as a remedy

² Asking people directly whether they think that they watch too much TV could, of course, lead to answers that are motivated by social desirability. It should be noted that surveys on general life satisfaction (as used in our study) are plausibly not affected by such a bias that is systematically correlated with some specific consumption behavior.

their unhappiness. Thereby, if more TV channels are available TV viewing is a more attractive alternative (relative, e.g., to drinking) for these people (individuals ?).

In our extended analysis, we do not find evidence for the first two alternative hypotheses. First, the negative marginal effect for additional TV channels holds for a sample adjusted to the differences in diffusion of terrestrial, cable and satellite TV across countries and over time. Second, heavy TV viewers among young adults and women do not experience an increase, but a reduction in the amount of well-being, similar to that found in the full sample. The third alternative explanation cannot be ruled out in our ex post facto design. Instead, we propose a refined two-step analysis and study the effect of additional TV channels separately for people who are assumed to have more or less (to have more and for those assumed to who have less ?) resources for self-regulation. In a series of additional sensitivity checks, the robustness of the basic finding is analyzed.

This study links to three strands of economic literature. First, it contributes to the recent research on media consumption and its consequences (see, e.g., Prat and Strömberg 2005; Bruni and Stanca 2006; Gentzkow 2006; Bruni and Stanca 2008; Gentzkow and Shapiro 2008; Benesch 2009). Second, it adds to the evolving literature on individual welfare, based on data on subjective well-being (for surveys see Frey and Stutzer 2002b; a; Layard 2005; Frey 2008). Third, it offers a complementary approach to studying time inconsistency in consumption choice (for a recent survey, see Frederick et al. 2002).

Section 2 outlines the idea of systematic errors in consumption due to time inconsistent preferences in a framework of decision utility and experienced utility. The testing strategy is derived from a simple graphical analysis. Section 3 presents the data and the results of the empirical application. Section 4 offers concluding remarks.

2. Decision Utility and Experienced Utility in a Model of Time Inconsistent Preferences

2.1 Self-Control and Time Inconsistency

Standard economics assumes that people have no self-control problems, and that they are able to make decisions based on their long-term preferences. Viewed this way, consuming goods and pursuing activities that some people consider (an addiction / addictive ?), or at least represent a bad habit, such as smoking cigarettes, watching (a high / an excessive ?) amount of TV, or constantly eating fast food, are considered a rational act. Contrary to this view,

many people judge their own and other people's consumption behavior as irrational, in the sense that they (think / believe ?) they would be better off if they consumed less of these goods. This emphasizes the role of myopia in individual behavior. People with myopic vision focus on consuming in the present moment and lack discernment or a long-term perspective in their thinking and planning, and thus undermine their well-being over time. Goods offering immediate (benefits / gratification ?) at negligible immediate marginal costs are generally tempting. The psychological literature offers a large body of evidence of low self-control (for an overview see e.g. Baumeister and Heatherton 1996). In economics, such inconsistent time preferences are most prominently formulated in models of (quasi-)hyperbolic discounting (see, e.g., Laibson 1997). A low discount factor (i.e. a discount factor decreased by β , $\beta \in (0,1)$) is applied between the present moment and some time in the near future and a constant discount factor δ thereafter. An excellent account of the recent extensive empirical and theoretical literature on time inconsistent preferences is provided by Frederick et al. (2002).

2.2 Decision Utility Versus Experienced Utility

Based on revealed preference, it is difficult to discriminate between the view of consumers as rational actors and consumers facing self-control problems.³ Therefore, two extensions of the traditional emphasis on ex ante evaluation and observed decisions are pursued. The first extension involves the standard economic concept of decision utility. It is complemented by the concept of experienced utility (Kahneman et al. 1997). The latter refers to an individual's evaluation of actual experiences in terms of positive and negative affects or in terms of satisfaction. This distinction between decision and experienced utility makes it possible that the ordering of experiences systematically diverges from the ordering of options derived from observed behavior. The second extension is closely related to the first, and emphasizes ex post evaluations as a valuable source of information about the possibility of bounded rationality in people's decision-making. How do people fare after they have made decisions? If temptation interferes with people's decision making, there might well be a (gap / discrepancy ?) between what individuals like and what they do.⁴

³ We are aware that there are specific situations in which the standard economic model rules out certain types of behavior and mere observation of a certain action rejects the standard economic model. There are some studies successfully pursuing this approach. Two important examples, that document the kind of behavior where the standard model does not apply, are DellaVigna and Malmendier (2006), who examine gym attendance under different contracts, and Skiba and Tobacman (2008), who show that certain types of payday loans would always be rejected by time-consistent individuals.

⁴ Our analysis of ex post evaluations of consumption decisions can be linked to the concept of regret as it is often understood in everyday language use. Regret is an emotional dislike of how oneself has acted in the past.

This poses the question of how the (normative) standard is ascertained, and whether seemingly irrational behavior should be judged welfare reducing, because it violates certain time consistency criteria. While there is an extended debate on this issue (see, e.g., Bernheim and Rangel 2005), we use people's own evaluation as a standard. This standard is operationalized in terms of individuals' judgments of their overall subjective well-being, rather than how they evaluate options when faced with a particular decision.

2.3 Theoretical Idea for a Testing Strategy

The conceptual framework of decision utility and experienced utility is summarized in a graphical analysis of a simple two-period model and extended to illustrate the empirical testing strategy. We outline the case in which an extended opportunity set, here the number of available TV channels, decreases the experienced utility of consumers with a severe self-control problem.⁵

An individual decides on the consumption of x , here the amount of time devoted to TV viewing, based on the enjoyment of x , i.e. utility $u(x)$ in period 1, and the future costs $c(x)$ in period 2, discounted by a factor δ . This reflects that benefits are experienced instantaneously, with zero immediate costs. One simply has to push a button. In contrast to going to the cinema, the theater or any outdoor activity, there is no need to appropriately dress before leaving the house, and there is no need to buy a ticket or to reserve a seat in advance. Unlike (most ? - you could go jogging or to the movies by yourself) other leisure activities, TV viewing does not need to be coordinated with others. As a consequence, compared to other leisure activities, watching TV has an exceedingly low or nonexistent entry barrier. The costs resulting from TV consumption are largely experienced in the future. The negative effects of not getting enough sleep, for example, only arise the next day, and the consequences of underinvestment in social contacts, education or career take much longer to manifest.⁶ In this choice situation, with TV viewing offering instant benefits at negligible immediate marginal

Emotions like sadness, shame, embarrassment, depression or guilt reduce experienced utility after pursuing some consumption activities (as the individual later wishes that he or she had not pursued them). This interpretation of regret is different from the concept of regret in economic decision theory (see, e.g., Loomes and Sugden 1982) where the behavior of people who have no problem to implement their preferred consumption plan is predicted.

⁵ Our analysis is related to the one by O'Donoghue and Rabin (2001), who show in a theoretical model that more choice among tasks with immediate costs and future benefits can lead to more severe procrastination, and that a person might procrastinate more when pursuing important goals rather than unimportant ones. Our analysis is much simpler and emphasizes the case in which a more attractive alternative with immediate benefits and future costs might lead to more severe myopic behavior.

⁶ An increase in one's material aspirations, due to the rich, famous and beautiful being overrepresented on the TV screen, might not be foreseen at all.

costs, time inconsistency may arise. At the outset, a consumer (i.e. in period 0) plans to spend x^* minutes watching TV, equalizing marginal benefits and marginal future costs, i.e. $u'(x)=\delta*c'(x)$ representing the first order condition. However, when faced with the actual decision about TV consumption and the temptation of immediate gratification, future costs are only partly taken into account (here by a factor $\beta \in (0,1)$) and the consumption plan is revised so as to equalize $u'(x)=\beta*\delta*c'(x)$. People who lack the self-control to maintain their original plans end up consuming x^c , i.e. more than they consider optimal for themselves in the long-run, and experience an individual welfare loss.

Figure 1 illustrates this situation for a specific set of preferences. It shows x^* , the planned consumption, and x^c , the actual consumption level chosen due to the self-control problem, i.e. $0\leq\beta<1$. The triangle ABC indicates the individual welfare loss due to over-consumption. Total experienced utility over the two periods is lower than what it could be if x^* were consumed.

[Figure 1 about here]

Based on people's reported judgment of their overall satisfaction with life, it would, in principle, be possible to directly capture the welfare loss. For otherwise similar people (individuals ?), the subjective well-being of heavy TV viewers could be compared with the subjective well-being of moderate viewers, and the difference be attributed to systematic errors in consumption due to a lack of willpower. However, this approach is empirically not feasible. An omitted variable bias could occur because unobserved individual differences, like being an introvert, might well be related to lower subjective well-being and higher TV consumption, regardless of any self-control problem. Reverse causation is possible: unhappy people might spend more time watching TV. Finally, preference heterogeneity with regard to TV viewing might be directly related to people's reports of their subjective well-being.

We argue that these empirical challenges can be overcome in a refined approach studying the expansion of the opportunity set. In the case of television, this is the ongoing increase in the number of TV channels available.

Figure 2 offers a graphical analysis that illustrates the idea. The expansion of the choice set is represented by an increase in the marginal utility of TV consumption from $u_1'(x)$ to $u_2'(x)$. An

individual with time-consistent preferences increases TV consumption from x_1^* to x_2^* and experienced utility is increased by the area ADG. For an individual with time-inconsistent preferences, there are two effects on experienced utility resulting from the shift in marginal utility. First, experienced utility from the initial amount of TV viewing is increased, as more channels are assumed to mean more variety and better preference satisfaction. In other words, consumer surplus is increased, reflected by the area ABHG⁷. Second, the increased attractiveness of TV viewing leads to a revision of consumption plans. At this stage, an expansion of the opportunity set might reduce overall experienced utility. As people with a self-control problem undervalue future costs when faced with the decision of turning their TV on or off, they increase consumption more than would be optimal. Again, they realize a level of experienced utility that is below what they could experience if they (could / were able ?) optimally choose TV consumption. The reduction in experienced utility due to a further increase in consumption amounts to the area CHEF. Whether more (opportunities / alternatives / choices ?) make people with a self-control problem worse off overall depends on the relative size of the two effects on people's experienced utility. If the two effects are studied theoretically, they depend, of course, on the assumed functional form for the marginal utility and marginal cost of TV viewing. With linear functions, the net effect is more likely to be negative the larger β and the less marginal utility $u'(x)$ is decreasing, i.e., the closer $u''(x)$ is to zero. In Figure 2, for the particular combination of marginal utility, marginal costs and β , CHEF is larger than ABHG.

[Figure 2 about here]

In the next section, our empirical analysis uses the possibility of a negative net effect as a testing strategy to identify self-control problems in TV consumption. It is hypothesized that the experienced utility of people with a severe self-control problem in TV viewing is reduced when they have access to a larger number of TV channels. We are aware that this is a conservative test and that the threshold is set high to reject the rationality hypothesis. Even if nobody loses from an increased opportunity set, there might still be over-consumption.

⁷ Area ABHG consists of two parts: ADG is the increase in actual consumer surplus and ABHD is part of the former welfare loss that is now offset.

However, the over-consumption cannot be detected, either by revealed behavior or by studying reported subjective well-being.

3. Empirical Analysis

3.1 Data

The empirical analysis is based on data from the first two waves of the European Social Survey (ESS) and the third and fourth waves of the World Value Survey (WVS), and supplemented by data on the number of TV channels at a country level collected by IP Network⁸. Data from the ESS is for 21 European countries in 2002/2003⁹ and 25 European countries in 2003 to 2006¹⁰. With the WVS, data on the number of TV channels is available for 28 countries in the years 1995 to 1997¹¹ and 2 countries in the years 2000/2001¹². Countries common to more than one survey are treated as separate entities, as they are observed (in / ? for? during ?) different years. We thus have no time dimension in our analysis but apply a cross-section framework. In each country, between about 600 and 3,000 individuals were interviewed, supplying us with a total sample of 127,949 observations.¹³

The three key variables in our analysis are TV consumption, reported satisfaction with life and the number of TV channels available in a country.

In the ESS, *television consumption* is captured by the question “On an average weekday, how much time do you spend watching television?”, with answers falling into 8 categories, ranging from “no time at all” to “more than 3 hours”. In the WVS, the question is “How much time do you usually spend watching television on an average weekday?”, with answers coded into 4 categories, ranging from “do not watch television or do not have access to TV” to

⁸ For the ESS data, see Jowell et al. (2003; 2005). The data are archived and distributed by the Norwegian Social Science Data Services (NSD). For the WVS data see European Values Study Group and World Values Survey Association (2006) and for the IP Network data see IP Network (several years).

⁹ The countries included are Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, The Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

¹⁰ The countries included are Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, and the United Kingdom.

¹¹ The countries included are Belarus, Brazil, Bulgaria, Croatia, the Czech Republic, Estonia, Finland, Germany, Hungary, India, Japan, Latvia, Lithuania, Macedonia, Mexico, Norway, Poland, Romania, Russia, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Ukraine, USA and Venezuela.

¹² The two countries are South Africa and Spain.

¹³ From the 131,189 people originally surveyed in the countries (used /examined ?), 2,336 did not answer the question regarding their amount of TV consumption and 993 did not answer the question about their life satisfaction.

“more than 3 hours”. For each category, the mid-point value of the time interval is calculated. For the top category “more than 3 hours”, 3.5 hours is chosen. Average TV viewing time in the sample is 2.0 hours (standard deviation 1.1). There is, however, substantial variation between countries. TV consumption is lowest in Mexico (with 1.1 hours) in wave 3 of the WVS and highest in Macedonia (with 2.7 hours) in wave 3 of the WVS.

Individual *life satisfaction* is measured by the question: “All things considered, how satisfied are you with your life as a whole nowadays / these days?” Answers are given on an 11-point scale ranging from 0 “extremely dissatisfied” to 10 “extremely satisfied” in the ESS, and on a 10-point scale ranging from 1 “dissatisfied” to 10 “satisfied” in the WVS. To make the two scales comparable, the lowest two categories in the ESS, 0 and 1, are combined into one category. Average life satisfaction in the sample amounts to 6.7 (standard deviation 2.4), ranging from a low of 4.0 in Ukraine in wave 3 of the WVS to a high of 8.5 in Denmark in wave 2 of the ESS.

In addition, both surveys include a large number of socio-demographic characteristics (mentioned below).

Statistical data on the number of *television channels* is available at the country level, published by IP Network in the form of the number of channels available to 70% of households. We take data that relates to the year the individuals were surveyed or the closest year available. The number of TV channels available to 70% of the population amounts, on average, to 10.3 channels (standard deviation 12.6) and ranges from 1 in India and Russia to 62 in the United States. The median is 4.5 channels (see Tables A1 and A3 in the Appendix). TV services are offered by terrestrial, cable and satellite providers. In the robustness analysis, we take into account that, due to the differences in the diffusion of these technologies, the measure for the number of channels might not be representative for the groups crucial to our empirical test.

3.2 Empirical Testing Strategy

We proceed in two steps to test for possible self-control problems in TV viewing. In the first step, individual TV viewing time is regressed on respondents’ socio-demographic characteristics for each of the 76 country samples separately, and the residual TV viewing time, not explained by these individual characteristics, is calculated. Heavy viewers, i.e. respondents who watch more TV than predicted by their individual characteristics, and who therefore have large residuals, are suspected to be those with a possible self-control problem

when it comes to television viewing. Having (at their disposal ?) many tempting TV channels tends to aggravate heavy viewers' self-control problem, leading to a higher utility loss than having fewer TV channels. Of course, heavy viewers could simply have an increased preference for TV consumption or they could have no higher-return activity available to them. (just be those with a high preference for TV consumption or with no higher-return activity available to them.) In both case, these people are assumed to optimally allocate their time in the standard model and more TV channels would raise their utility level, as it increases the probability that there (is / exists ?) a program that matches their preferences. It should at least not reduce their utility level, because they could (just / simply) ignore the additional channels. (In the robustness analysis below, we will test for differential consequences of competition between TV channels on different groups of heavy TV viewers.) The individual characteristics we use to explain TV viewing time are household income, age, gender, nationality (i.e. whether born in the country of residence or not), employment status, education, marital status, type or size of place of living and, additionally for the ESS, household size and working hours¹⁴. Between 3% and 32% of the variation in TV viewing time is explained by these individual characteristics. Table A2 in the Appendix takes the OLS regression for the United Kingdom as an example. Residual TV viewing time ranges from - 3.41 to 2.21 hours. In order to make the residuals comparable across countries, they are converted into deciles for each country.

In the second step, we test how additional TV channels affect the individual welfare of unpredictably heavy TV viewers.¹⁵ If the latter have a self-control problem, they are expected to experience lower individual well-being with additional channels. In our test, reported life satisfaction is used as an approximation to individual welfare.

Our empirical testing strategy differs substantially from prior research in behavioral economics. This research generally studies whether the explanatory power of an (empirical) model is increased when the variation in people's level of self-control is (additionally / also ?) taken into account. Empirically, limited self-control is captured, for example, by using

¹⁴ It has to be noted that some of these variables could be systematically related to having a self-control problem. It could, for example, be hypothesized that people with low self-control face a higher probability of becoming unemployed. Controlling for employment status might therefore not be appropriate. However, only controlling for the exogenous factors age and gender in the first step does not change the general results of the subsequent empirical analysis.

¹⁵ In our setting a country level variable for the number of TV channels is preferable to a variable that captures them at the individual level. The latter variable would reflect individuals' choices (and thus the number of channels would be driven partly by individuals' preferences). In contrast, we are interested in an overall restriction to the degree TV viewers are tempted.

behavioral markers, like not having a bank account or having had many hangovers from alcohol consumption in the recent past (see, e.g., DellaVigna and Paserman 2005), by letting people in experiments choose between immediate payoffs and higher delayed payoffs (Thaler 1981), or by measures of self-report (e.g. Tangney et al. 2004).

However, psychological theories emphasize the idea that self-control is not a (character ?) trait but a resource, i.e. there is a limited capacity for self-regulation. Resisting one temptation may result in poorer regulation of a concurrent desire for immediate gratification, or vice versa (Muraven et al. 1998). Accordingly, markers of self-control problems in one domain (e.g., smoking or drinking) need not (to go with / be connected to ?) over-consumption in (another / a different ?) domain. Hence, self-control problems need to be studied for specific domains. Moreover, in the mentioned approaches any welfare consequences of supposedly shortsighted behavior are not directly analyzed but are rather assumed or derived from some imposed objective utility function. Often, the preferred consumption plan of the ‘planning self’ is taken as a reference standard. A combination of the previous approaches and the approach proposed here is (also not easy / equally difficult): Individual characteristics and behavioral markers are of limited use as indicators of self-control or as instruments in microeconomic life satisfaction equations if they are expected to also directly affect people’s subjective well-being.

It is important to emphasize that we do not propose residual television watching as an indicator of limited self-control. Instead, we consider the two-step analysis as a test of the self-control hypothesis. Independently of the approach, all the standard identification problems (like spurious correlations due to third variables, selection bias, etc.) apply. For our application, a series of issues is discussed in section 3.4 on robustness.

3.3 Results

In order to generate the basic results, two microeconomic life satisfaction functions are specified. In the first one, the life satisfaction LS_i of individual i depends on (the decile of) his or her residual television consumption $ResidTV_i$, (as an indicator of a possible self-control problem regarding TV consumption), on the interaction between this indicator and the number of TV channels N_j available in country j in a given year, on personal characteristics X_i , as well as on country specific effects D_j :

$$LS_i = \beta_0 + \beta_1 ResidTV_i + \beta_2 (ResidTV_i * \log(N_j)) + \gamma_1 X_i + \gamma_2 D_j + \varepsilon_i \quad (1)$$

The control variables used are income, age, gender, whether born in the country of residence or not, employment status, education, and marital status. The variables are not coded in exactly the same way in both surveys, but similar enough to make them comparable.

Column A in Table 1 shows the regression results for the first specification.¹⁶ The interaction effect between residual TV viewing and the logarithm of the number of channels available has a negative sign, is large (-0.014) and statistically significant at the 99%-level. The higher a person's residual TV consumption is, the smaller the marginal effect of an additional channel on his or her life satisfaction. Yet, according to this specification, it cannot be assessed whether more TV channels in fact have a negative effect on the life satisfaction of heavy TV viewers. The marginal effect of the number of TV channels on life satisfaction could just be smaller for people with high residuals than for people with low residuals, but not negative. However, it can already be said that people who watch much more TV than predicted, based on their individual characteristics, seem to benefit the least from additional TV channels. If unpredictably high TV consumption indeed reflects personal tastes, then already this result might come as a surprise.

[Table 1 about here]

In order to calculate the marginal effect according to the level of residual TV viewing, we specify a second extended life satisfaction function. In addition to the variables in equation (1), the number of TV channels available in a country is included in the regression. As this information is at a country level, country specific fixed effects can no longer be controlled for. Instead, we add the control variables Gross National Income (adjusted for comparative price level) in its logarithmic form $\log(GNI_j)$, as well as average TV viewing time $AvgTV_j$ in a country¹⁷. This leaves us with the following second specification:

¹⁶ For ease of interpretation an OLS estimator is applied. Given the ordinal nature of the dependent variable, we re-estimated our two basic models applying ordered probit specifications. The relative size and statistical significance of coefficients are very similar to the results of the OLS estimations. The results based on ordered probit regressions are available from the authors on request.

¹⁷ Data for Gross National Income are from World Development Indicators (several years), and data for average TV viewing time are from IP Network (several years).

$$LS_i = \beta_0 + \beta_1 ResidTV_i + \beta_2 \log(N_j) + \beta_3 (ResidTV_i * \log(N_j)) + \gamma_1 X_i + \gamma_2 \log(GNI_j) + \gamma_3 AvgTV_j + \varepsilon_i \quad (2)$$

Column B in Table 1 shows the results for this specification. The interaction term between residual TV viewing and the number of TV channels is robust and again has the same size and statistical significance as in the previous specification. For further interpretation of the coefficients, it has to be taken into account that the number of TV channels and residual TV viewing time are mean adjusted. The coefficient of the constitutive term number of TV channels (natural logarithm) is therefore estimated for TV consumers with an average residual (the ones in the 5th decile). It captures the marginal effect on life satisfaction if TV viewers have more channels to choose from. It is estimated to be negative (-0.04) but not statistically significant. From the latter coefficient and the interaction term, the marginal effects of the number of TV channels on life satisfaction can now be calculated for different levels of residual TV viewing. The calculations are presented in Figure 3a) together with the 90% and 95%-confidence interval.¹⁸

[Figure 3 about here]

For people in the first decile of residual TV viewing time, i.e. those watching much less than predicted, having a higher number of TV channels to choose from has no impact on their life satisfaction. The marginal effect is close to zero. For people with above average residual TV viewing time, the marginal effect becomes negative and approaches statistical significance. Respondents viewing much more TV than predicted (10th decile) report ceteris paribus a 0.12 lower life satisfaction (t-value=1.64) when, for example, living in a country with 10 TV channels compared to living in a country with only 3 TV channels. This effect is sizeable; it corresponds for example to one fifth of the difference in life satisfaction between married and divorced people (-0.62).

We also estimated a more flexible specification (not shown in Table 1), allowing the marginal effect of additional TV channels to vary freely for each decile of residual TV consumption.

¹⁸ For a discussion of the interpretation and presentation of interaction models, see Brambor et al. (2006).

This specification gives up the restriction that there is a linear relationship between residual TV viewing and the marginal effect of additional TV channels, as implied by the former specification. Figure 3b) presents the results of the more flexible specification, which includes dummy variables for each decile of residual TV consumption. The calculated marginal effects of additional TV channels on life satisfaction show a similar (similar – as; comparable – to) pattern and magnitude to the more rigid specification.

Thus, heavy TV viewers not only seem to benefit less from additional TV channels, but also experience a reduced level of life satisfaction. This finding is not consistent with (a universe of sovereign ? unclear to me – This finding is not consistent with the results which show that commonly TV consumers benefit from... ?) TV consumers benefiting from a larger (choice set / set of choices / increased number of choices?). Rather, the finding suggests heterogeneity in self-control and is consistent with the view that part of observed individual TV consumption is due to a lack of will power when exposed to the temptation of satisfying immediate pleasure. Referring to our graphical analysis in subsection 2.3, on average, about 10% of the respondents (taking the 90% significance level as a cutoff point) experience a net welfare loss from an increase in the number of TV channels, i.e. area CHEF is larger than ABHG. Applying the same statistical cutoff point, there is no group of respondents that experiences statistically significantly higher individual welfare if the number of TV channels is increased.

3.4 Robustness

In our robustness analysis, we address three alternative explanations for the observed patterns in the correlation between TV viewing and life satisfaction in relation to the number of TV channels. Moreover, we study the sensitivity of the results with regard to alternative specifications and sample selections. The first alternative questions the representativeness of the measure on the number of TV channels for the group of heavy viewers. A spurious negative correlation for the interaction term could emerge if the following scenario were to occur: in countries with, on average, few channels, only the rich and happy can afford satellite TV, have more channels than normal and therefore also watch more TV. In contrast, in countries where almost everyone has cable or satellite TV, people watching a lot of TV tend to be unhappy, lonely or unemployed. Across countries, heavy TV viewers would seem less satisfied with more channels. A second alternative explanation suggests that TV markets with many channels rather than a few channels differ in other respects than just program variety. A

concern about the documented relationship between TV channels and life satisfaction is therefore that it actually reflects some differences between media markets rather than suboptimal decisions by some individuals. Third, the observed pattern could be the result of selection effects. Dissatisfied people more often watch TV to (improve / alleviate) their miserable situation if there are more TV channels available. or: To help alleviate their miserable situation, dissatisfied people watch more TV if more TV channels are available.

a) Measures on the number of TV Channels

Our measure for the number of TV channels, i.e. the number of TV channels received by 70% of the population as published by IP Network, is arbitrary to some extent. All the same, it probably provides a good approximation of the average choice of TV programs in a country. Moreover, it is exogenous to individual choice, which fits the design of our empirical test. However, it does not take into account the variance of the number of TV channels within a country.

This aspect disturbs our testing strategy if (i) the number of TV channels at the individual level is correlated with individual TV viewing time and life satisfaction within a country and (ii) this correlation is systematically different between countries with a low aggregate number of TV channels and countries with a high aggregate number. In the scenario mentioned above, the happy heavy viewers in the (poor) countries with few TV channels might then be compared with the unhappy heavy viewers in the (affluent) countries with many TV channels. It is important to note though, that any such effect needs to go beyond the individual characteristics (like income) controlled for in the estimation equations, determining the heavy viewers *separately* for each country sample.

In our first robustness check, we aim at compiling country samples of individuals for whom the information on the number of TV channels is representative. We do this by excluding observations at the tails of the distribution of residual TV viewing time, taking into account information on market penetration with terrestrial, cable and satellite TV. The following procedure is applied. Households with only terrestrial TV usually have access to just a few channels, while the offer is larger for households with cable or satellite TV. If 70% or more of the households in a country only have terrestrial TV, the measure on the number of TV channels available is probably sufficiently accurate for these households. However, it is not accurate for the households with cable or satellite TV. In this case, the percentage of

respondents with cable or satellite TV is excluded from the analysis (i.e., the respective percentage of respondents with the highest residual TV viewing time). Accordingly, if 70% or more have access to cable or satellite TV, we exclude the percentage with only terrestrial TV (i.e. the respective percentage of respondents with the lowest residual TV viewing time).

The exclusion procedure is thus based on the assumption also underlying the alternative hypothesis that the individual number of TV channels and individual (residual) TV viewing time are positively correlated within a country.

Data on terrestrial cable and satellite diffusion are from IP Network and shown in Table A3 in the Appendix. The fraction of people who only have access to terrestrial TV in our data base is smallest in Luxembourg and the Netherlands (around 1%), and largest (in the early surveys) in Brazil (89%), the Ukraine (93%) and Greece (99%). Table 2 presents the regression results after the samples have been adjusted. The number of country samples drops from 76 to 73, as the specific data is not available for 3 countries¹⁹. The number of observations drops from 127,949 to 88,424 due to the exclusion criteria described above.

[Table 2 about here]

The same specifications as in Table 1 are estimated. It is found that the results are robust to the adjustment of the samples. The estimated coefficient for the interaction term is even larger in absolute terms (0.22) than in Table 1. Figure 4 shows the marginal effects of additional TV channels on life satisfaction. They are large, negative and statistically significant at the 95 % level for intermediate and high levels of residual TV viewing time. Thus, the findings for the full country samples cannot easily be explained by differences in the diffusion of different TV technologies.

[Figure 4 about here]

¹⁹ The 3 country samples excluded are Macedonia, the Czech Republic, and Mexico for WVS 3. The difference between the results in Table 1 and Table 2 is not mainly due to this difference in observations.

b) Young adult viewers and female viewers

The second robustness test looks at an alternative explanation of the partial correlations in terms of differences in media markets. In countries where people have access to more TV channels, TV markets tend to be less regulated and (annoying) commercial time might be higher. Some theoretical models of TV markets show a trade-off between diversity (i.e. number of channels) and the average quality of programs. In a population with heterogeneous preferences, some groups might therefore lose from an increased choice of programs (see, e.g., Liu et al. 2004; Anderson and Coate 2005; Liu et al. 2006). Furthermore, there might be social costs associated with increased TV viewing due to having more channels, even if the individual viewing choice was rational (see e.g. Putnam 2000; Corneo 2005).

Many of these possible market differences will affect heavy and light viewers alike and do not undermine our empirical test based on an interaction hypothesis. However, some differences might mainly impact individuals with a high preference for TV viewing. To address this concern, we run our regressions for different subgroups of the population.

It is well-documented that in highly competitive TV markets, with many channels available, the programs are tailored to viewer groups of particular interest to advertisers (see, e.g., Hamilton 2004 for a comprehensive discussion). These are mainly young adult viewers and female viewers (being the “main purchase responsables” in a household). In contrast, in less competitive markets with fewer channels, and to a large extent government or license fee financed channels, programs are (oriented towards / targeted at / aimed at / intended for) broader viewing groups. The young adult viewers and female viewers should thus gain the most – or lose the least – when more channels are available. If the negative relationship between the number of TV channels and life satisfaction for heavy viewers is due to omitted market characteristics, rather than a lack of individual self-control, the relationship should be less pronounced or non-existent for these groups.

[Table 3 about here]

Table 3 presents the regression results for the specified age and gender groups. In comparison to the estimates for the entire population in Table 1, the size and the statistical significance of the coefficients hardly change when looking only at young adult viewers (first regression in

Table 3) or female viewers (second regression in Table 3). If anything, the marginal effect of the number of channels on life satisfaction for heavy viewers tends to increase (and becomes statistically significant at higher levels). This finding runs counter to the alternative explanation in terms of rational TV consumers, that differential effects of additional TV channels benefit some heavy TV viewers while harming others. The groups most likely to benefit, young adult viewers and female viewers, who spend a lot of time watching TV, actually report lower life satisfaction when they have access to more channels. The finding thus lends further support to the hypothesis that unpredictably heavy TV viewers face a problem of limited self-control when making their consumption decisions.

c) General resources for self-regulation

Our basic testing approach rests on the assumption that (the same / certain) people will be heavy TV viewers (independently / regardless) of the number of TV channels available. However, there might be systematic selection of (more / an increased number of) unhappy people turning towards TV viewing if there are more TV channels available. This alternative explanation based on selection cannot easily be rejected empirically. We control for many observable characteristics that are correlated with low satisfaction with life. However, there may be unobserved characteristics that drive selection.

As an alternative strategy, we propose a refined two-step analysis. Additional predictions are to be derived that cannot easily be aligned with a selection explanation. Therefore, we are looking for a variable that helps to *ex ante* identify people who are more or less prone to (fall victim to) temptations that challenge the implementation of their preferred plans of action. This follows the idea that people have a limited capacity for self-regulation (see subsection 3.2 above).

Interestingly, involvement in religious activities has been found to positively correlate with measures of self-control and personality traits that subsume aspects of self-control. Religion can promote self-control insofar as it influences the selection, pursuit and management of goals and fosters self-monitoring and self-regulatory (strength / tenacity) (see, e.g., McCullough and Willoughby 2009). This can be interpreted in terms of religious people possessing more will power to stick to their planned allocation of time. Accordingly, it can be tested whether more religious people suffer less from self-control problems with regard to TV consumption and the temptations arising from an increased choice set, i.e. the number of TV channels.

In an exploratory analysis, the refined two-step test is implemented by estimating separate life satisfaction equations (for the interaction between (residual) TV viewing and the number of TV channels) for religious and non-religious (people / individuals). Religious activity is measured in terms of frequency of religious service attendance. Respondents are classified as religious if their attendance is above the country median. We are aware that the distinction between religious and non-religious people is a rough one (picking up / recognizing), e.g., differences in denominations and country specific organizations of the religious market or individual differences in social capital. However, (the / this) differentiation is still appropriate in order to illustrate that our two-step approach can be refined to provide additional testable predictions. We find that the estimated interaction effect between residual TV viewing and number of TV channels is indeed smaller for religious people (-0.010, $t=2.85$) than for non-religious people (-0.017, $t=3.21$) (see Table 4). For religious people, the marginal effect of the number of TV channels on life satisfaction is statistically not significant for (all / any) level of residual TV viewing, neither when applying a linear specification nor a specification based on categories of residual TV viewing. In contrast, for non religious people the marginal effect is negative and statistically significant at conventional levels for high residual TV viewing (see Figure 6).

[Table 4 about here]

[Figure 6 about here]

d) Alternative specifications and sample selections

The sensitivity of the general findings is further analyzed by using alternative measures for heavy TV viewers and by checking for influential outliers.

First, our strategy for using residual TV viewing rather than actual TV viewing rests on the idea that there are many reasons why some people watch more TV than others and that these factors should be statistically controlled for. There is, however, a trade-off in the sense that factors are (partialled out / excluded ?) that are potentially correlated with limited resources of self-control. Accordingly, we check the robustness of our results using two other measures: (i) country deciles of residual TV viewing calculated from a regression only, including (sex /

gender) and age as explanatory variables, and (ii) reported TV viewing time that is mean adjusted for each country.

The results stay robust and (get / become) slightly more pronounced using these alternative measures. Table 5 shows the coefficient for the interaction term between residual TV viewing and the number of TV channels. It is estimated -0.021 (t-value = -3.90) compared to -0.015 in the baseline specification. In Figures 7a and 7b this larger negative interaction term and the similar effect for the number of TV channels is reflected in a statistically stronger negative marginal effect than in the baseline specification (see Figure 3). A negative marginal effect for additional TV channels is also found if reported TV viewing time (mean adjusted at country level) is included in the estimation and interacted with the number of TV channels (see Table 5 and Figure 7c).

[Table 5 about here]

[Figure 7 about here]

Second, in order to (get an idea of / explain / clarify / illustrate) whether the results are driven by some outliers, Figure 8 shows a scatter plot. For each country-wave, the partial correlation coefficient of residual TV viewing on life satisfaction (from a regression explaining life satisfaction with residual TV watching and controls) is plotted as a function of the corresponding number of TV channels. Each plotted (point / dot) is labeled with the (abbreviation of the / abbreviated) country name and the data source.

[Figure 8 about here]

Overall, there exists a negative relationship between the estimated coefficients and the number of channels (as was to be expected from the regression analysis). Potentially influential observations become visible that lead to a smaller or a bigger interaction effect if they are excluded. ??? not very clear to me. Potentially influential observations so become visible; they illustrate that if excluded (from the analysis ???) they lead to a decreased or increased interaction effect. ???

If the observations for India (WVS3) and Bulgaria (WVS3) are excluded, the interaction effect becomes somewhat smaller. In the regression for the whole sample, the coefficient drops from -0.015 ($t=-3.93$) to -0.012 ($t=-3.84$). However, it is still statistically significant at the 99% level. Moreover, the marginal effect of the number of TV Channels on the life satisfaction of heavy TV viewers is still statistically significant at conventional levels in most regressions, i.e., in regressions applying either a linear specification or categories when the sample is adjusted for cable/satellite TV and in the regression that restricts the sample to young adult viewers. However, the statistical significance of the marginal effect for the 10th decile falls below conventional levels for the whole sample.

4. Concluding Remarks

Standard economic theory assumes that individuals are rational in the sense that they (can / do / are able to ??) decide on the optimal amount of consumption, based on their own evaluation. In particular, a larger choice set is expected to increase (or at least not decrease) utility, as it enables people to better match their preferences with the supply. Behavioral economics has identified various circumstances in which that assumption is questionable. This paper adds (another / an additional) case, in which self-control problems lead to excessive TV viewing, according to viewers' own evaluations.

Of course, it does not follow that the government should intervene, because its actions might well make the situation worse. It is presumably more effective to support individuals who are subject to self-control problems by showing them how to work with their issues, for example by proposing self-binding mechanisms (for a broader discussion see, e.g., O'Donoghue and Rabin 2005).

Rational choice is probably an appropriate characterization of a large fraction of observed behavior. TV consumption might, however, pose a challenge, and may even be a particularly relevant one, because TV is one of the most time-consuming activities (of people / for individuals) in today's world: in many countries, for their entire lives, people spend, on average, as many hours watching TV as they do working. Hardly anyone would deny that watching TV provides pleasure, at least some of the time, and that it is an important source of information. Yet, as our research suggests, some people are not able to optimally (trade off / balance) the benefits and the (future) costs associated with it.

Our analysis is an explanation of the amount of TV consumption rather than of marginal reactions due to changes in relative prices. Valuable insights can be gained from going even further in this direction. In fact, the most immediate consequence of television (watching ?) – the immense time consumption – has so far received little attention in research. The growing body of work on the economics of time use (see, e.g., the collected studies in Hamermesh and Pfann 2005) will hopefully shed further light on how individuals allocate the ultimate scarce resource, time.

References

- Anderson, Simon P. and Stephen Coate (2005). Market Provision of Broadcasting: A Welfare Analysis. *Review of Economic Studies* 72(4): 947-972.
- Baumeister, Roy F. and Todd F. Heatherton (1996). Self-Regulation Failure: An Overview. *Psychological Inquiry* 7(1): 1-15.
- Becker, Lee B. and Klaus Schoenbach (eds) (1989). *Audience Responses to Media Diversification: Coping with Plenty*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Benesch, Christine (2009). Local TV Markets and Elections. Working Paper, Institute for Empirical Research in Economics, University of Zurich.
- Bernheim, B. Douglas and Antonio Rangel (2005). Behavioral Public Economics: How to Do Welfare Analysis When People Can Make Mistakes. In: Peter A. Diamond and Hannu Vartiainen (eds). *Economic Institutions and Behavioral Economics*. Princeton: Princeton University Press.
- Brambor, Thomas, William Roberts Clark and Matt Golder (2006). Understanding Interaction Models: Improving Empirical Analyses. *Political Analysis* 14(1): 63-82.
- Bruni, Luigino and Luca Stanca (2006). Income Aspirations, Television and Happiness: Evidence from the World Values Survey. *Kyklos* 59(2): 209-225.
- Bruni, Luigino and Luca Stanca (2008). Watching Alone: Relational Goods, Television and Happiness. *Journal of Economic Behavior and Organization* 65(3-4): 506-528.
- Corneo, Giacomo (2005). Work and Television. *European Journal of Political Economy* 21(1): 99-113.
- DellaVigna, Stefano and Ulrike Malmendier (2006). Paying Not to Go to the Gym. *American Economic Review* 96(3): 694-719.
- DellaVigna, Stefano and M. Daniele Paserman (2005). Job Search and Impatience. *Journal of Labor Economics* 23(3): 527-588.
- European Values Study Group and World Values Survey Association (2006). European and World Values Surveys Four-Wave Integrated Data File, 1981-2004, V.20060423. Aggregate File Producers: Análisis Sociológicos Económicos y Políticos (ASEP) and JD Systems (JDS), Madrid, Spain/Tilburg University, Tilburg, The Netherlands. Data Files Suppliers: Analisis Sociologicos Economicos y Politicos (ASEP) and JD Systems (JDS), Madrid, Spain / Tillburg University, Tillburg, The Netherlands / Zentralarchiv fur Empirische Sozialforschung (ZA), Cologne, Germany. Aggregate File Distributors: Análisis Sociológicos Económicos y Políticos (ASEP) and JD

- Systems (JDS), Madrid, Spain / Tilburg University, Tilburg, The Netherlands / Zentralarchiv für Empirische Sozialforschung (ZA) Cologne, Germany.
- Frederick, Shane, George Loewenstein and Ted O'Donoghue (2002). Time Discounting and Time Preference: A Critical Review. *Journal of Economic Literature* 40(2): 351-401.
- Frey, Bruno S. (2008). *Happiness Research: A Revolution in Economics*. Cambridge, MA: MIT Press.
- Frey, Bruno S. and Alois Stutzer (2002a). *Happiness and Economics: How the Economy and Institutions Affect Well-Being*. Princeton, NJ: Princeton University Press.
- Frey, Bruno S. and Alois Stutzer (2002b). What Can Economists Learn from Happiness Research? *Journal of Economic Literature* 40(2): 402-435.
- Frey, Bruno S. and Alois Stutzer (2005). Testing Theories of Happiness. In: Luigino Bruni and Pierluigi Porta (eds). *Economics and Happiness. Framing the Analysis*. Oxford: Oxford University Press: 116-146.
- Gentzkow, Matthew (2006). Television and Voter Turnout. *Quarterly Journal of Economics* 121(3): 931-972.
- Gentzkow, Matthew and Jesse M. Shapiro (2008). Preschool Television Viewing and Adolescent Test Scores: Historical Evidence from the Coleman Study. *Quarterly Journal of Economics* 123(1): 279-323.
- Gruber, Jonathan and Sendhil Mullainathan (2005). Do Cigarette Taxes Make Smokers Happier? *B.E. Journals in Economic Analysis and Policy: Advances in Economic Analysis and Policy* 5(1): 1-43.
- Hamermesh, Daniel S. and Gerard A. Pfann (eds) (2005). *The Economics of Time Use*. Contributions to Economic Analysis, 271. Amsterdam and Boston: Elsevier.
- Hamilton, James T. (2004). *All the News That's Fit to Sell. How the Market Transforms Information into News*. Princeton, NJ: Princeton University Press.
- IP Network (ed.) (several years). *Television: International Keyfacts*. Cologne, Germany: IP Network.
- Jowell, Roger and the Central Co-ordinating Team (2003). European Social Survey 2002/2003: Technical Report. Centre for Comparative Social Surveys, City University, London.
- Jowell, Roger and the Central Co-ordinating Team (2005). European Social Survey 2004/2005: Technical Report. Centre for Comparative Social Surveys, City University, London.

- Kahneman, Daniel, Peter P. Wakker and Rakesh Sarin (1997). Back to Bentham? Explorations of Experienced Utility. *Quarterly Journal of Economics* 112(2): 375-405.
- Kubey, Robert (1996). Television Dependence, Diagnosis, and Prevention: With Commentary on Video Games, Pornography, and Media Education. In: Tannis M. Williams (ed.). *Tuning into Young Viewers: Social Science Perspectives on Television*. Thousand Oaks, CA: Sage: 221-260.
- Laibson, David (1997). Golden Eggs and Hyperbolic Discounting. *Quarterly Journal of Economics* 112(2): 443-477.
- Layard, Richard (2005). *Happiness: Lessons from a New Science*. New York, NY: Penguin.
- Liu, Yong, Daniel S. Putler and Charles B. Weinberg (2004). Is Having More Channels Really Better? A Model of Competition among Commercial Television Broadcasters. *Marketing Science* 23(1): 120-133.
- Liu, Yong, Daniel S. Putler and Charles B. Weinberg (2006). The Welfare and Equity Implications of Competition in Television Broadcasting: The Role of Viewer Tastes. *Journal of Cultural Economics* 30(2): 127-140.
- Loomes, Graham and Robert Sugden (1982). Regret Theory - an Alternative Theory of Rational Choice under Uncertainty. *Economic Journal* 92(368): 805-824.
- McCullough, Michael E. and Brian L. B. Willoughby (2009). Religion, Self-Regulation, and Self-Control: Associations, Explanations, and Implications. *Psychological Bulletin* 135(1): 69-93.
- Muraven, Mark, Dianne M. Tice and Roy F. Baumeister (1998). Self-Control as Limited Resource: Regulatory Depletion Patterns. *Journal of Personality and Social Psychology* 74(3): 774-789.
- O'Donoghue, Ted and Matthew Rabin (2001). Choice and Procrastination. *Quarterly Journal of Economics* 116(1): 121-160.
- O'Donoghue, Ted and Matthew Rabin (2005). Incentives and Self-Control. Working Paper, Cornell University and University of California at Berkeley.
- Prat, Andrea and David Strömberg (2005). Commercial Television and Voter Information. CEPR Discussion Paper No. 4989, London: Centre for Economic Policy Research.
- Putnam, Robert D. (2000). *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon & Schuster.

- Skiba, Paige and Jeremy Tobacman (2008). Payday Loans, Uncertainty, and Discounting: Explaining Patterns of Borrowing, Repayment, and Default. Working Paper, University of Pennsylvania.
- Sparks, Glenn G. and Cheri W. Sparks (2002). Effects of Media Violence. In: Jennings Bryant and Dolf Zillmann (eds). *Media Effects. Advances in Theory and Research*. Mahwah, NJ: Lawrence Erlbaum Associates: 269-285.
- Tangney, June P., Roy F. Baumeister and Angie Luzio Boone (2004). High Self-Control Predicts Good Adjustment, Less Pathology, Better Grades, and Interpersonal Success. *Journal of Personality* 72(2): 271-324.
- Thaler, Richard H. (1981). Some Empirical Evidence on Dynamic Consistency. *Economic Letters* 8(3): 201-207.
- Weimann, Gabriel (1996). Cable Comes to the Holy Land: The Impact on Cable TV on Israeli Viewers. *Journal of Broadcasting & Electronic Media* 40: 243-257.
- World Bank (several years). *World Development Indicators*. Washington, DC: The World Bank.

Figure 1: The Loss of Experienced Utility with Time Inconsistent Preferences

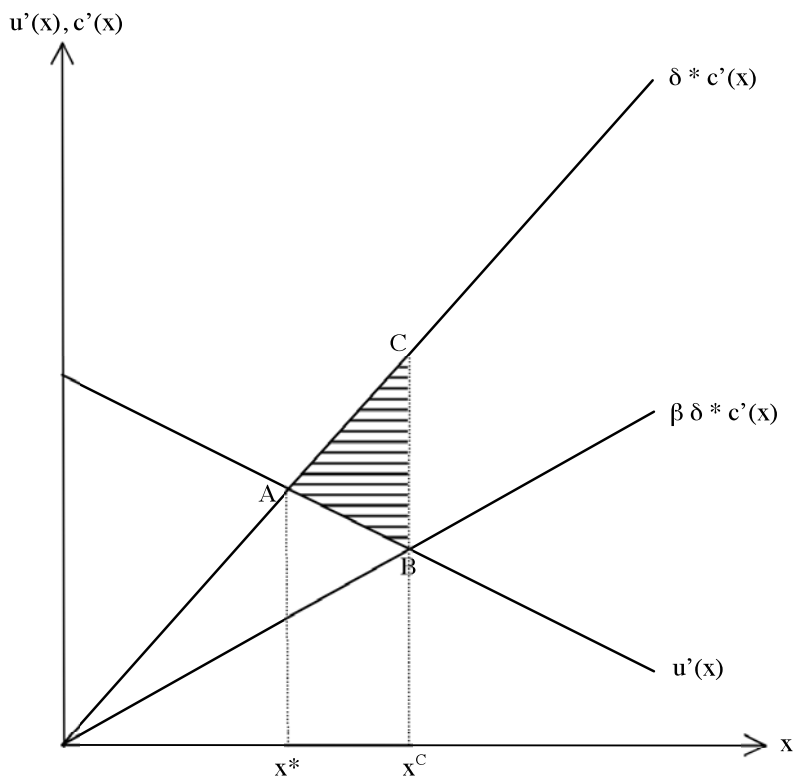


Figure 2: Gains and Losses in Experienced Utility Due to a More Attractive Technology

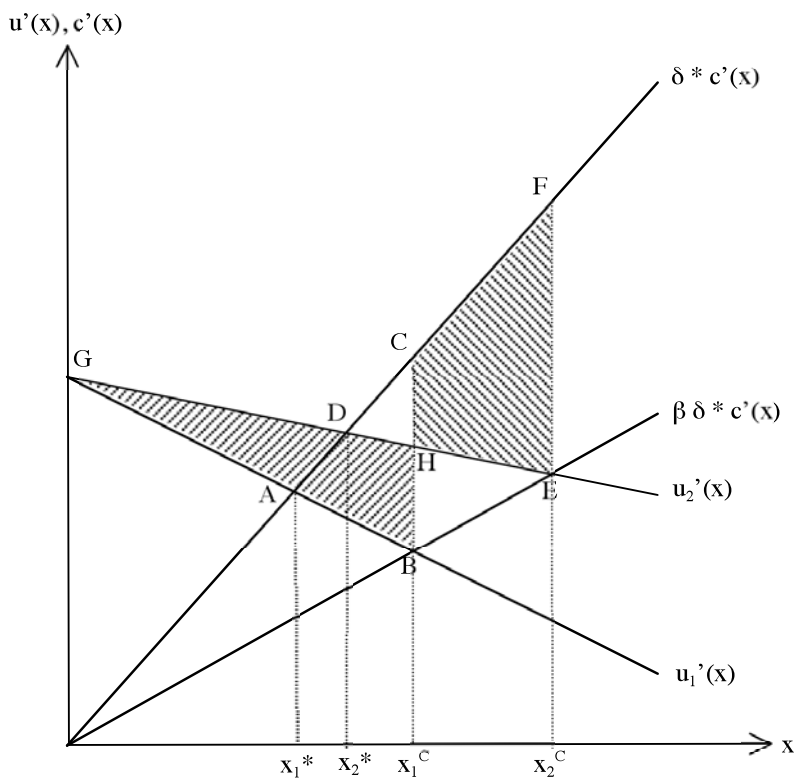


Table 1: TV Consumption, Number of TV Channels and Life Satisfaction

<i>Dependent variable:</i>	A		B	
Life satisfaction	Coefficient	t-value	Coefficient	t-value
Decile of residual TV viewing (5 th decile=0)	-0.014 **	-4.30	-0.013 **	-4.15
log (number of TV channels, mean adjusted)			-0.038	-0.60
Decile of residual TV viewing * log (number of TV channels)	-0.015 **	-3.99	-0.015 **	-3.93
Income deciles	0.112 **	13.04	0.105 **	8.69
Age	-0.081 **	-17.38	-0.087 **	-18.34
Age, squared	0.001 **	17.55	0.001 **	18.47
Male		Reference group		
Female	0.083 **	4.78	0.028	0.093
Not born in country of residence		Reference group		
Born in country of residence	0.218 **	6.18	0.359 **	7.35
Paid work, employed				
Paid work, self-employed	0.078 (*)	1.91	0.284 **	3.31
Unemployed	-0.898 **	-15.08	-0.861 **	-11.21
Retired	-0.033	-1.00	-0.087 *	-2.26
In education	0.263 **	6.22	0.256 **	5.39
Housework, looking after children	0.046	1.30	0.234 **	3.25
Doing other work	-0.544 **	-8.51	-0.575 **	-7.81
No formal or incomplete primary education	-0.458 **	-5.05	-0.336 **	-2.83
Complete basic or primary education		Reference group		
Upper or post secondary, non-tertiary education	0.161 **	5.77	0.075	1.27
Tertiary education	0.294 **	7.64	0.289 **	4.84
Married		Reference group		
Divorced	-0.620 **	-15.47	-0.628 **	-12.93
Separated	-0.882 **	-14.68	-0.846 **	-11.26
Widowed	-0.580 **	-16.12	-0.626 **	-16.39
Not married, living with partner	-0.313 **	-7.85	-0.248 **	-5.02
Not married, living without partner	-0.528 **	-19.20	-0.485 **	-15.00
GNI per capita (PPP), log			1.221 **	6.69
Average TV viewing time in country (minutes)			-0.010 **	-5.06
Year fixed effects		Yes		Yes
Country fixed effects		Yes		No
Constant	6.922 **	56.46	-1.828	-0.94
Observations		127, 949		127, 949
R ²		0.25		0.20

Notes: (1) OLS estimates with standard errors adjusted for clustering at country level.

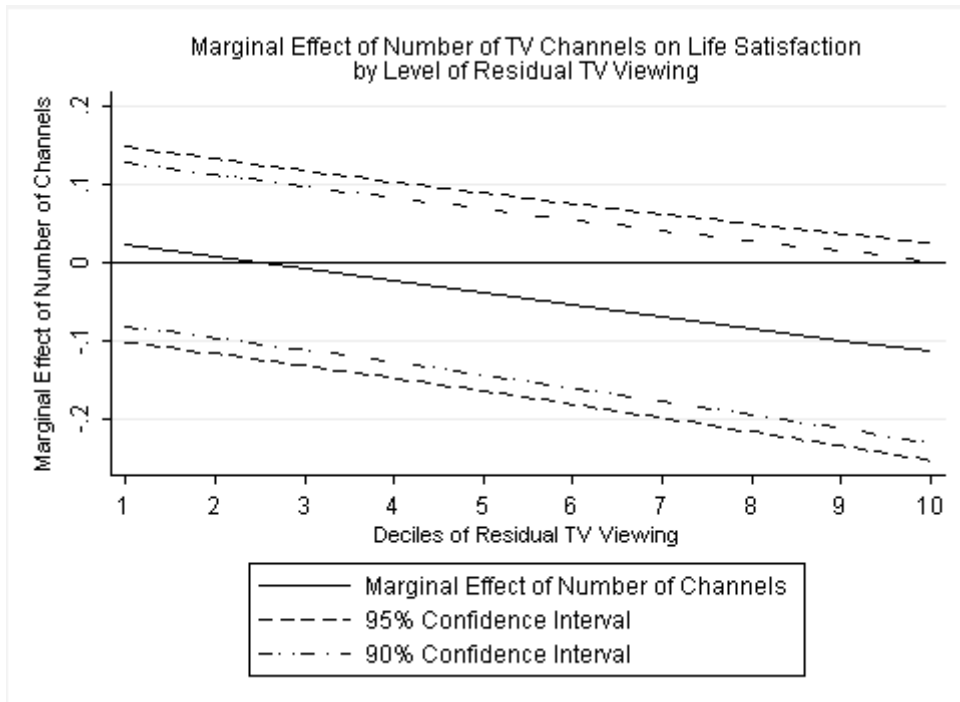
(2) ** significant at 99% level, * significant at 95% level, (*) significant at 90% level.

(3) Dummy variables for the different countries and years are not shown. Dummy variables for missing observations for income, age, gender, country of birth, employment status, education, and marital status are also not shown.

Data sources: European Social Survey (Wave 1 & 2), World Value Survey (Wave 3 & 4), IP Network (several years), World Development Indicators (several years).

Figure 3: Number of TV Channels and Life Satisfaction

a) Linear specification of residual TV viewing



b) Specification based on categories of residual TV viewing

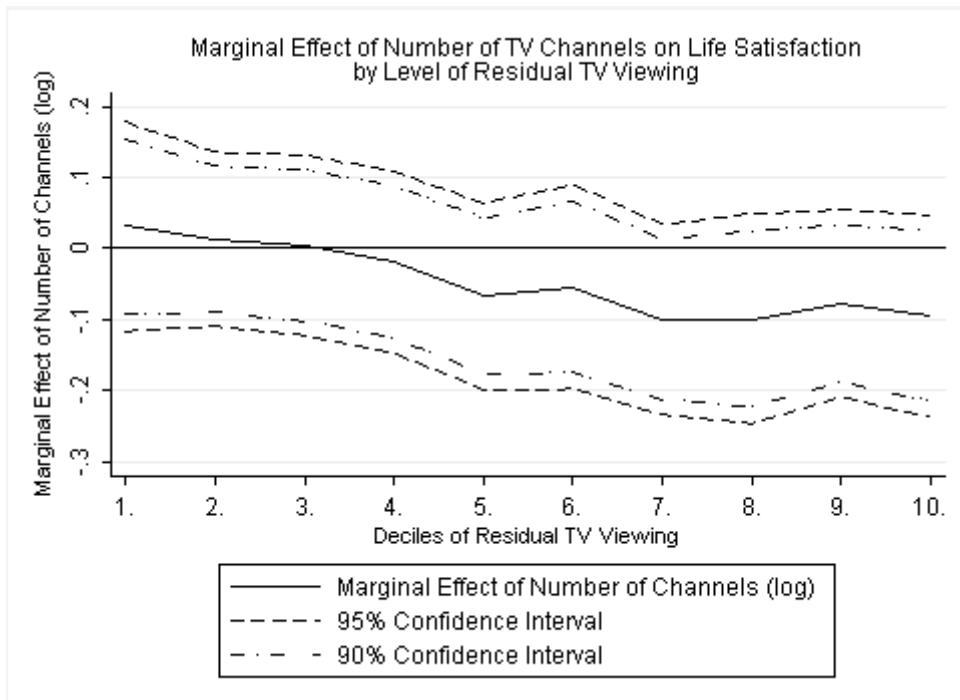


Table 2: TV Consumption, Number of TV Channels and Life Satisfaction: Country samples adjusted for the diffusion of terrestrial, cable and satellite TV

<i>Dependent variable:</i>				
	A		B	
Life satisfaction	Coefficient	t-value	Coefficient	t-value
Decile of residual TV viewing (5 th decile=0)	-0.006	-1.48	-0.006	-1.35
log (number of TV channels, mean adjusted)			-0.097	-1.51
Decile of residual TV viewing * log (number of TV channels)	-0.022 **	-4.36	-0.022 **	-4.30
Individual control variables ⁽³⁾	Yes		Yes	
Control variables at country level ⁽⁴⁾	Yes		Yes	
Year fixed effects	Yes		Yes	
Constant	8.388 **	47.32	-2.408	-1.25
Observations	88,424		88,424	
R ²	0.26		0.22	

Notes: (1) OLS estimates with standard errors adjusted for clustering at country level.

(2) ** significant at 99% level, * significant at 95% level, (*) significant at 90% level.

(3) Individual control variables are the same as in Table 1 and include income, age, gender, whether born in the country of residence or not, employment status, education, and marital status, as well as dummy variables for missing observations for income, age, gender, country of birth, employment status, education, and marital status.

(4) Control variables at country level are the same as in regression B in Table 1 and include log GNI per capita (PPP) and average TV viewing time.

Data sources: European Social Survey (Wave 1 & 2), World Value Survey (Wave 3 & 4), IP Network (several years), World Development Indicators (several years).

Figure 4: Number of TV Channels and life satisfaction adjusted for terrestrial, cable and satellite distribution

a) Linear specification of residual TV viewing b) Specification based on categories of residual TV viewing

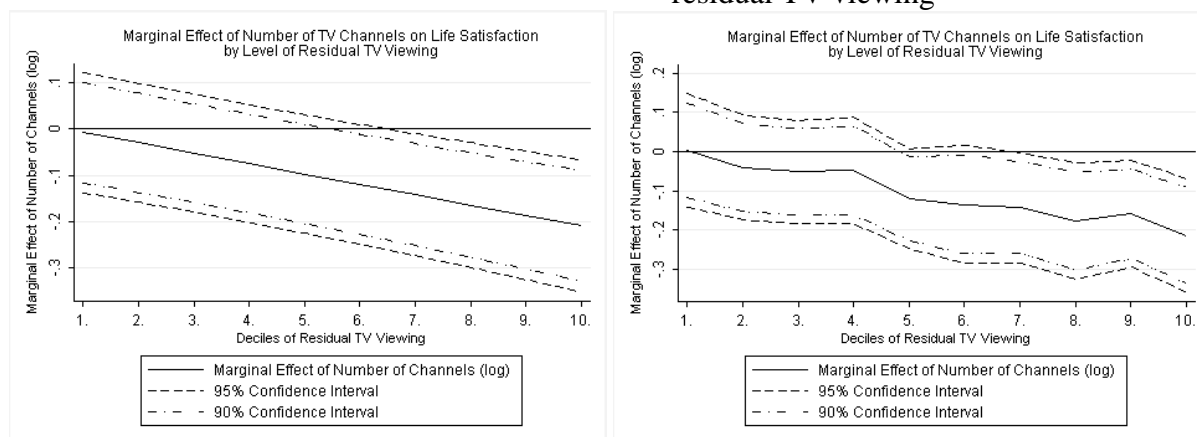


Table 3: TV Consumption, Number of TV Channels and Life Satisfaction of Young Adult Viewers and Female Viewers

<i>Dependent variable:</i>	Young adult viewers (18-34)		Female viewers	
	Coefficient	t-value	Coefficient	t-value
Life satisfaction				
Decile of residual TV viewing (5 th decile=0)	-0.014 **	-3.18	-0.012 **	-3.27
log (number of TV channels, mean adjusted)	-0.096 (*)	-1.69	-0.043	-0.65
Decile of residual TV viewing * log (number of TV channels)	-0.015 **	-3.55	-0.016 **	-3.83
Individual control variables ⁽³⁾	Yes		Yes	
Control variables at country level ⁽⁴⁾	Yes		Yes	
Year fixed effects	Yes		Yes	
Constant	0.469	0.27	-3.320 (*)	-1.70
Observations	40,733		67,760	
R ²	0.20		0.21	

Notes: (1) OLS estimates with standard errors adjusted for clustering at country level.

(2) ** significant at 99% level, * significant at 95% level, (*) significant at 90% level.

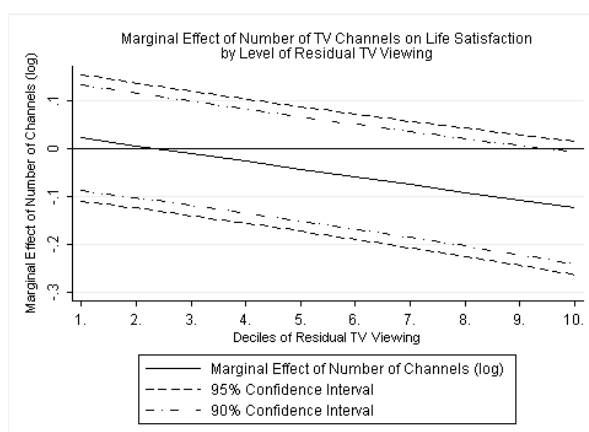
(3) Individual control variables are the same as in Table 1 and include income, age, gender, whether born in the country of residence or not, employment status, education, and marital status, as well as dummy variables for missing observations for income, age, gender, country of birth, employment status, education, and marital status.

(4) Control variables at country level are the same as in regression B in Table 1 and include log GNI per capita (PPP) and average TV viewing time.

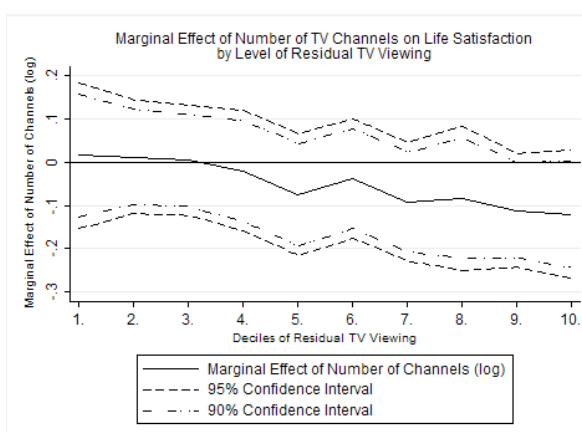
Data sources: European Social Survey (Wave 1 & 2), World Value Survey (Wave 3 & 4), IP Network (several years), World Development Indicators (several years).

Figure 5: Number of TV Channels and Life Satisfaction of Young Adult Viewers and Female Viewers

a) Female viewers, linear specification



b) Female viewers, specification based on categories of residual TV viewing



a) Young adult viewers, linear specification b) Young adult viewers, specification based on categories of residual TV viewing

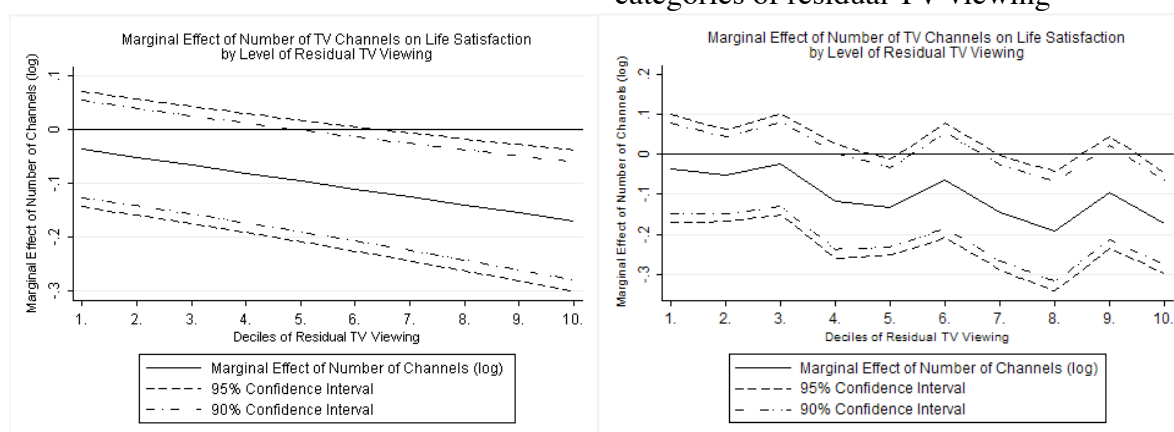


Table 4: TV Consumption, Number of TV Channels and Life Satisfaction of Religious and Non-Religious People

<i>Dependent variable:</i> Life satisfaction	Religious		Non-religious	
	Coefficient	(t-value)	Coefficient	(t-value)
Decile of residual TV viewing (5 th decile=0)	-0.014**	(-3.15)	-0.010**	(-2.63)
log (number of TV channels, mean adjusted)	-0.011	(-0.15)	-0.067	(-1.07)
Decile of residual TV viewing * log (number of TV channels)	-0.010**	(-2.85)	-0.017**	(-3.21)
Individual control variables ⁽³⁾	Yes		Yes	
Control variables at country level ⁽⁴⁾	Yes		Yes	
Country fixed effects	No		No	
Year fixed effects	Yes		Yes	
Constant	-1.995	(-0.93)	-2.639	(-1.47)
Observations	43,931		84,018	
R ²	0.22		0.20	

Notes: (1) OLS estimates with standard errors adjusted for clustering at country level, t-values in brackets.

(2) ** significant at 99% level, * significant at 95% level, (*) significant at 90% level.

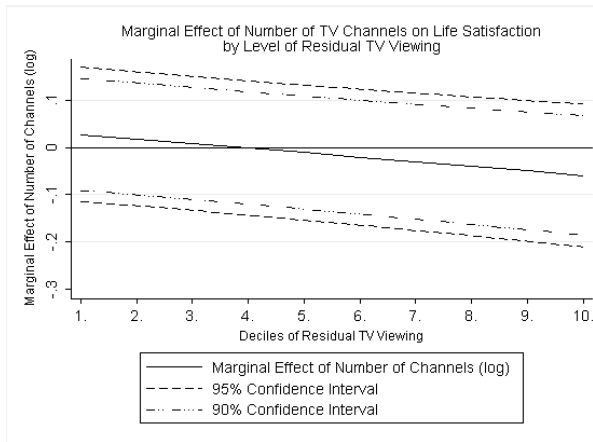
(3) Individual control variables are the same as in Table 1 and include income, age, gender, whether born in the country of residence or not, employment status, education, and marital status.

(4) Control variables at country level are the same as in regression B in Table 1 and include log GNI per capita (PPP) and average TV viewing time.

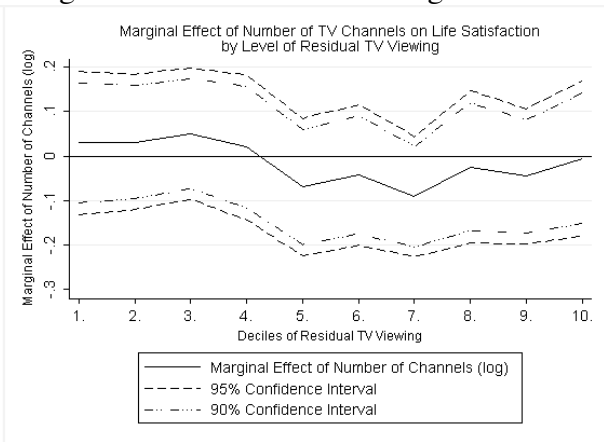
Data sources: European Social Survey (Wave 1, 2 & 3), World Value Survey (Wave 3 & 4), IP Network (several years), World Development Indicators (several years).

Figure 6: Number of TV Channels and Life Satisfaction: Religious and Non-Religious People

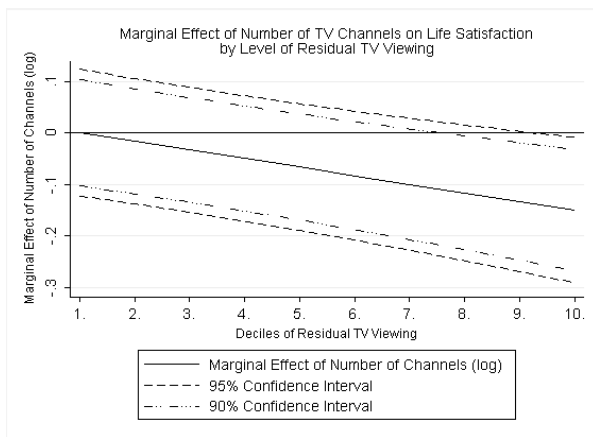
a) religious people, linear specification



b) religious people, specification based on categories of residual TV viewing



a) non-religious people, linear specification



b) non-religious people, specification based on categories of residual TV viewing

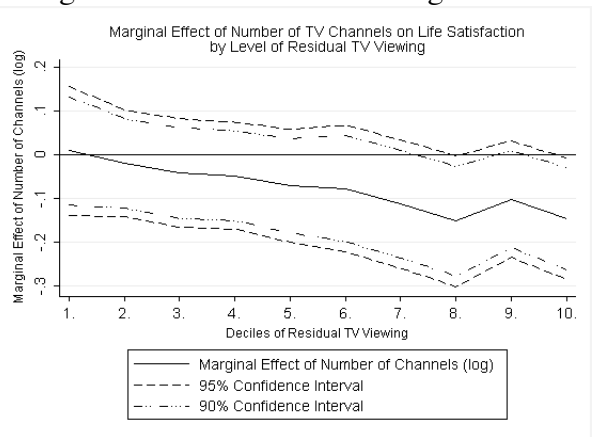


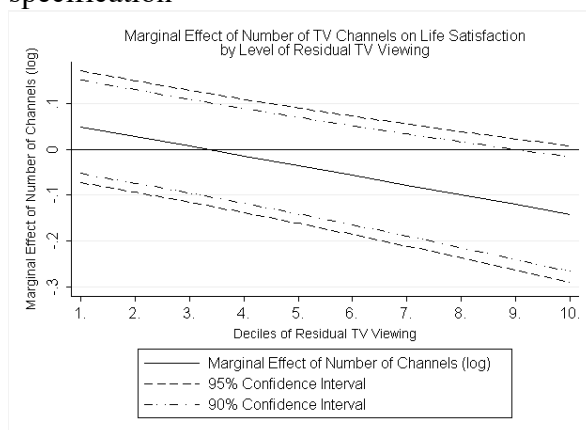
Table 5: TV Consumption, Number of TV Channels and Life Satisfaction: Different Indicators for Potential Self-control Problems

<i>Dependent variable:</i> Life satisfaction	(A)		(B)	
	Coefficient	(t-value)	Coefficient	(t-value)
Indicator of TV viewing	-0.14**	(3.08)	-0.021	(-1.56)
log (number of TV channels, mean adjusted)	-0.036	(-0.56)	-0.046	(-0.71)
Indicator of TV viewing * log (number of TV channels)	-0.021**	(-3.90)	-0.051**	(-3.43)
Individual control variables ⁽⁴⁾	Yes		Yes	
Control variables at country level ⁽⁵⁾	Yes		Yes	
Country fixed effects	No		No	
Year fixed effects	Yes		Yes	
Constant	-1.813	(-0.93)	-1.827	(-0.93)
Observations	127,949		127,949	
R ²	0.20		0.20	

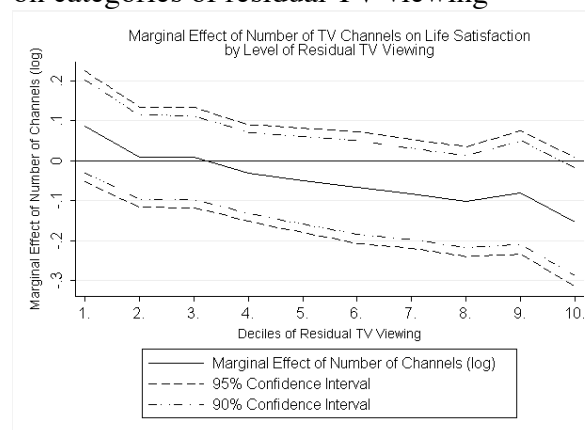
Notes: (1) OLS estimates with standard errors adjusted for clustering at country level, t-values in brackets. (2) In regression (A) the indicator of TV viewing is residual TV viewing calculated only controlling for age and (sex / gender) (deciles; 5th decile=0). In regression (B) the indicator of TV viewing is hours of TV viewing mean adjusted in each country separately. (3) ** significant at 99% level, * significant at 95% level, (*) significant at 90% level. (4) Individual control variables are the same as in Table 1 and include income, age, gender, whether born in the country of residence or not, employment status, education, and marital status, as well as dummy variables for missing observations for income, age, gender, country of birth, employment status, education, and marital status. (5) Control variables at country level are the same as in regression B in Table 1 and include log GNI per capita (PPP) and average TV viewing time. *Data sources:* European Social Survey (Wave 1 & 2), World Value Survey (Wave 3 & 4), IP Network (several years), World Development Indicators (several years).

Figure 7: Number of TV Channels and Life Satisfaction: Different Indicators for Potential Self-control Problems

a) Residual TV viewing calculated only controlling for age and (sex / gender), linear specification based specification



b) Residual TV viewing calculated only controlling for age and (sex / gender) on categories of residual TV viewing



c) Reported TV viewing time mean adjusted in each country separately

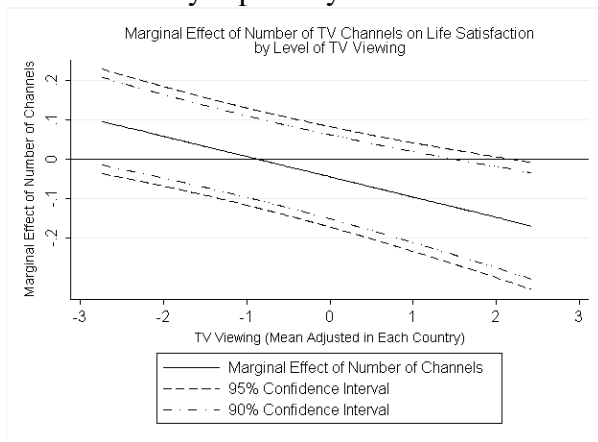
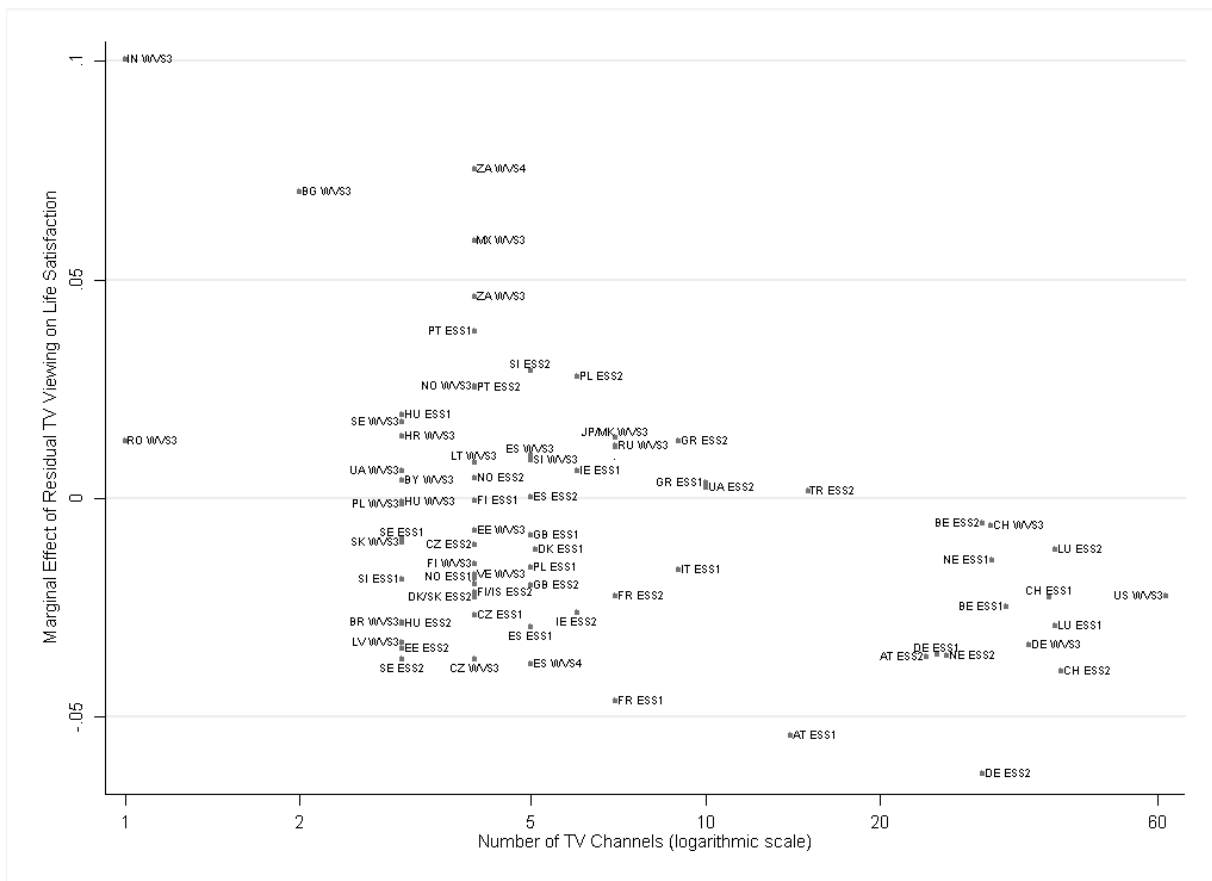


Figure 8: Marginal Effect of Residual TV Viewing on Life Satisfaction and Number of TV Channels by Country and Survey



Appendix

Table A1: Descriptive Statistics

	Mean	Standard deviation	Median	Minimum	Maximum	Number of observations
TV viewing (hours)	1.98	1.06	1.75	0.00	3.50	127,949
Residual TV viewing (hours)	0.00	0.94	-0.02	-3.41	3.21	127,949
Life satisfaction	6.71	2.39	7.00	1.00	10.00	127,949
TV channels	10.33	12.55	4.50	1.00	62.00	76

Data sources: European Social Survey (Wave 1 & 2), World Value Survey (Wave 3 & 4), IP Network (several years).

Table A2: Covariates of TV Viewing in the United Kingdom

Dependent variable:

TV viewing time (hours)	Coefficient	t-value
log (household income)	-0.122 **	-3.78
Square root (household size)	-0.122	-1.61
Working hours	-0.004 *	-2.47
Age	-0.004	-0.40
Age, squared	-0.01e-3	-0.14
Male	Reference group	
Female	-0.051	-0.99
Not born in country of residence	Reference group	
Born in country of residence	0.156 *	1.96
Paid work	Reference group	
In education	-0.097	-0.76
Unemployed, actively looking for a job	0.324 *	2.21
Unemployed, not actively looking for a job	-0.162	-0.77
Disabled, chronically ill	0.586 **	5.08
Retired	0.462 **	5.06
Housework, looking after children	0.256 **	3.16
Doing other work	-0.139	-0.55
Not completed primary education	-1.503	-1.45
Primary or first stage of basic education	Reference group	
Lower secondary or second stage of basic education	-0.024	-0.09
Upper secondary education	-0.292	-1.03
Post-secondary, non-tertiary education	-0.155	-0.54
First stage of tertiary education	-0.509 (*)	-1.82
Second stage of tertiary education	-0.819 **	-2.32
Married, living with partner	Reference group	
Married, living without partner	0.198	0.48
Separated, living with partner	0.099	0.36

Table to be continued

Continuation of Table A2

Separated, living without partner	-0.134	-0.96
Divorced, living with partner	0.162	1.00
Divorced, living without partner	-0.140	-1.51
Widowed, living with partner	0.473	0.95
Widowed, living without partner	-0.014	-0.15
Never been married, living with partner	0.027	0.26
Never been married, living without partner	-0.199 *	-2.46
Living in big city	Reference group	
Living in suburbs	0.131	1.27
Living in town	0.141	1.43
Living in small village	0.125	1.19
Living in the countryside, on a farm	-0.200	-1.27
Constant	3.702 **	7.75
Observations	2,045	
R ²	0.15	

Notes:

(1) OLS estimate.

(2) ** significant at 99% level, * significant at 95% level, (*) significant at 90% level.

(3) Dummy variables for missing observations for income, household size, working hours, age, gender, country of birth, employment status, education, marital status, and place of residence are not shown.

Data source: European Social Survey (Wave 1).

Table A3: Diffusion of Terrestrial, Cable, and Satellite TV

Country	Survey	No. of TV Channels for 70% of Population	Only Terrestrial TV	Cable or Satellite TV
Austria	ESS 1	14	13%	87%
Austria	ESS 2	24	15%	85%
Belgium	ESS 1	32.5	3%	97%
Belgium	ESS 2	30	3%	97%
Brazil	WVS 3	3	89%	11%
Bulgaria	WVS 3	2	55%	45%
Belarus	WVS 3	3	83%	17%
Croatia	WVS 3	3	62%	38%
Czech Republic	ESS 1	4	71%	29%
Czech Republic	ESS 2	4	75%	25%
Czech Republic	WVS 3	4		
Denmark	ESS 1	5.5	17%	83%
Denmark	ESS 2	4	19%	81%
Estonia	ESS 2	3	49%	52%
Estonia	WVS 3	4	80%	20%
Finland	ESS 1	4	44%	56%
Finland	ESS 2	4	28%	72%
Finland	WVS 3	4	56%	44%
France	ESS 1	7	67%	33%
France	ESS 2	7	61%	39%
Germany	ESS 1	25	7%	93%
Germany	ESS 2	30	3%	97%
Germany	WVS 3	36	12%	88%
Greece	ESS 1	10	99%	1%
Greece	ESS 2	9	99%	1%
Hungary	ESS 1	3	37%	63%
Hungary	ESS 2	3	34%	66%
Hungary	WVS 3	3	20%	80%
Iceland	ESS 2	4	87%	13%
India	WVS 3	1	77%	23%
Ireland	ESS 1	6	40%	60%
Ireland	ESS 2	6	35%	65%
Italy	ESS 1	9	83%	17%
Japan	WVS 3	7	78%	22%
Latvia	WVS 3	3	69%	31%
Lithuania	WVS 3	4	78%	22%
Luxembourg	ESS 1	40	2%	98%
Luxembourg	ESS 2	40	1%	100%
Mexico	WVS 3	4		
Netherlands	ESS 1	29	1%	100%
Netherlands	ESS 2	26	1%	100%
Norway	ESS 1	4	31%	69%
Norway	ESS 2	4	28%	73%
Norway	WVS 3	4	44%	56%

Table to be continued

Continuation of Table A3

Poland	ESS 1	5	42%	58%
Poland	ESS 2	6	47%	53%
Poland	WVS 3	3	51%	49%
Portugal	ESS 1	4	57%	43%
Portugal	ESS 2	4	50%	51%
Romania	WVS 3	1	46%	54%
Russia	WVS 3	7	83%	17%
Slovakia	ESS 2	4	52%	48%
Slovakia	WVS 3	3	20%	80%
Slovenia	ESS 1	3	35%	65%
Slovenia	ESS 2	5	33%	67%
Slovenia	WVS 3	5	51%	49%
South Africa	WVS 3	4	80%	20%
South Africa	WVS 4	4	78%	22%
Spain	ESS 1	5	78%	22%
Spain	ESS 2	5	72%	29%
Spain	WVS 3	5	92%	8%
Spain	WVS 4	5	61%	39%
Sweden	ESS 1	3	28%	72%
Sweden	ESS 2	3	24%	77%
Sweden	WVS 3	3	37%	63%
Switzerland	ESS 1	39	5%	95%
Switzerland	ESS 2	41	6%	95%
Switzerland	WVS 3	31	23%	77%
Turkey	ESS 2	15	68%	32%
Ukraine	ESS 2	10	58%	42%
Ukraine	WVS 3	3	93%	7%
Macedonia	WVS 3	7		
Great Britain	ESS 1	5	53%	47%
Great Britain	ESS 2	5	36%	64%
United States	WVS 3	62	27%	73%
Venezuela	WVS 3	4	86%	14%

Data Source: IP Network (several years).
