

Attrition in the Swiss Household Panel

Attrition im Schweizer Haushalt Panel

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Abstract

In this paper, we analyze magnitude and possible selectivity of attrition in first wave respondents in the Swiss Household Panel (SHP), from wave two (2000) through wave seven (2005). After comparing attrition of first wave respondents with that of other panel surveys, we proceed to model selectivity of attrition in two steps: we first build separate wave-to-wave models, and second a longitudinal all-wave model. The latter model includes wave interaction effects. The first models allow for tracing of selectivity development, i.e. whether an initial selectivity might compensate or cumulates over time, the second to assessing the effects of the covariates in a specific wave, controlling for the base attrition effect. In particular it allows for the analysis of consequences due to discrete fieldwork events.

Our results support the findings in the literature: attritors are in general the younger people and the males, foreigners, the socially and politically "excluded", i.e. those who show little social and political interest and participation, those who are mostly dissatisfied with various aspects in their life, and those who live in households with high unit nonresponse, and who exhibit a worse reporting behavior. This pattern is rather cumulative than compensating over panel waves. Excessive attrition in two waves presumably caused by two discrete events in the panel is not particularly selective. Still existing variation in selective attrition is worth to be further explored.

Zusammenfassung

In diesem Artikel werden Ausmaß und Selektivität der Panelattrition im Schweizer Haushalt Panel zwischen den Wellen zwei (2000) und sieben (2005) untersucht. Die Stichprobenbasis bilden die Teilnehmer der ersten Welle (1999). Nach einem Vergleich der Höhe und der Selektivität der Attrition mit anderen Haushaltpanels wird die Selektivität in zwei Schritten modelliert: zunächst durch Übergangsmodelle, in denen jeweils zwei aufeinanderfolgende Wellen verwendet werden, und schließlich durch ein Längsschnittmodell unter Verwendung aller Wellen. Letzteres enthält Wellendummies. Die Übergangsmodelle dienen dazu, Selektivität zu identifizieren und weiterzuerfolgen, d.h. zu erkennen, ob sich eine initiale Selektivität im Laufe der Zeit verstärkt oder ausgleicht. Mit dem Längsschnittmodell können spezifische Effekte von Kovariaten in einzelnen Wellen untersucht werden, wobei die Basisattrition kontrolliert wird. Insbesondere können die Auswirkungen einzelner Panelereignisse analysiert werden.

Die Ergebnisse bestätigen bisherige Erkenntnisse aus der Literatur: Personen, die aus dem Panel aussteigen sind tendenziell jünger und männlich, Ausländer, mit geringem sozialen und politischen Interesse und Engagement, die mit verschiedenen Lebensaspekten Unzufriedenen, die in Haushalten mit hohem Unit-Nonresponse lebenden und diejenigen mit schlechterer Befragungsqualität. Dieses Muster bleibt im Lauf des Panels bestehen. Die hohe Attrition in zwei Panelwellen, die vermutlich von singulären Ereignissen herrühren, ist nicht übermäßig selektiv.

1 Introduction¹

The major purpose of a household panel survey, in which individuals in households are surveyed repeatedly over waves, is to represent the real dynamics in the sample population. If individuals other than non-sample cases drop out of the panel ("attrition"²), this has at first obvious consequences on the longitudinal sample size. However, other than making analyses impossible due to cell sizes becoming too small after some waves, or merely producing higher standard errors in descriptive statistics, a selective attrition may in addition lead to wrong conclusions of important measures under consideration. For instance, in a recent analysis, Stocké and Stark (2005) show with data from the Eurobarometer³ that due to listwise deletion of individuals because of item nonresponse the share of persons going to a vote is around 9% higher than including the whole sample. Because the mechanisms leading to item nonresponse in a cross-sectional survey or to attrition in a panel survey might originate from similar factors (Loosveldt/Pickery/Billiet 2002, and the literature review below), we generally suspect a selective attrition in longitudinal surveys. E.g. in the British Household Panel Survey (BHPS), several refusal conversion techniques are being applied, showing that converted refusals have characteristics which are partly distinct from easier to convince respondents (Burton et al. 2004). Thus the characteristics of the members of a panel might well change after a longer time period.

Attrition is usually modelled and predicted with the help of standard socio demographic variables collected in a former wave. E.g., in the German GSOEP the size of the community a respondent lives is significant for the odds of a successful contact (Spiess/Kroh 2005). In the European Household Panel (EHP) the individual longitudinal panel response can be explained to a good extent by the *socio-demographic variables* age, employment status (i.e., full-time vs. not), and partnership (Nicholetti/Perrachi 2005). However, it is important to note that the socio-demographics are "fallible: they are correlates, not causes of the survey participatory behaviour" (Groves/Couper 1996: 81). This is emphasized also by Stoop (2005), who specify these causes for (non)cooperation: "social isolation, social participation, ..., interest in societal well-being, doing voluntary work, political interest and knowledge, ..., electoral participation, the type of sponsor, and attitudes towards surveys" (p. 126). Therefore, if available, variables measuring political interest and social participation (e.g. Pickery/Loosveldt/Carlton 2001), and item nonresponse (INR) on difficult (Loosveldt/Pickery/Billiet 2002) or sensitive (Schräpler 2004) questions to include motiva-

1 This work is supported by the Swiss National Science Foundation. I wish to thank my colleagues at the SHP for their valuable comments. Eric Graf suggested to conduct an in-depth correlation analysis, which led to the finally used aggregated health and satisfaction parameters. I would like to thank three anonymous reviewers for helpful comments. Any responsibility for the analysis or interpretations presented in this paper is however with the author.

2 With the term attrition we refer to all drop outs of a panel survey, i.e. refusals (non-cooperation) and non contacts of all *interview eligible* individuals (i.e. all who continue to be part of the sample: all who did not deceased, are not being institutionalized, or for whom a valid reason for a proxy interview is given; see for the latter in the case of the SHP <http://www.swisspanel.ch/project/participation/index.php?lang=en&pid=53>).

3 http://ec.europa.eu/public_opinion/index_en.htm (3.7.2007).

tional factors are usually used in analyses on attrition. Groves et al. give the theoretical concepts to explain unit nonresponse in surveys (2004: 176):

"The theoretical perspectives that are most commonly applied to survey participation include

- '*opportunity costs*' (which is) based on the notions that busy persons disproportionately refuse to be interviewed because the costs of spending time away from any other pursuits is more burdensome than for others ...
- '*social isolation*', which influence persons at the high and low ends of the socio-economic spectrum to refuse survey requests ...
- '*topic interests*' (and motivation), which fuel hypotheses about how the interested disproportionately responding ...
- '*oversurveying*' that suggests fatigue from survey requests."

In addition to the cross-sectional factors, there is in addition the longitudinal aspect that the reasons to attrite from a panel need not be constant: De Keulenaer (2004) analyzing attrition in the Panel Study of Belgian Households, finds "that the effects of SES variables decrease with additional wave ..., while the effects of the variables describing the *interview situation* increase ..." (p. 5).

In the literature on attrition evidence is reported for all issues but to opportunity costs. As to *opportunity cost* related variables, one might e.g. think of interview time. In the US-Panel Survey on Income Dynamics (PSID), although proved to be negatively correlated with panel attrition, interview length has found not to be causally related to attrition (Zabel 1998). In the Household, Income and Labour Dynamics in Australia (HILDA) panel survey, a non significant relation exists between attrition and interview time (Watson/Wooden 2004). The latter state in this regard that "Interview time, ... is a product of instrument length, respondent interest in the survey, and respondent difficulty with the questions. Consequently, we expect the interview length to comprise a mix of respondents, some of whom found the interview very difficult and others who enjoyed the experience." (p. 302). Moreover, different interview length in the same survey is largely a matter of filter complexity: those who find themselves in more filters, usually have a specific socio-demographic status. This applies especially to individuals who are in the labour force, and have therefore to answer a number of work related questions. It can thus be expected that interview length correlates with the socio-demographic status.

As to *social isolation* factors, Watson and Wooden (2004), using the HILDA panel survey, find that attritors after one wave are more likely to have reported lower life satisfaction levels, are more likely renter of a flat rather than owner of a house or a flat. Also housing conditions have been shown to be significant in terms of attrition in other large panel surveys (Watson and Wooden 2004, Fitzgerald et al. 1998, Zabel 1998, Gray et al. 1996). However, in the HILDA survey, when controlling interview situation in the first wave, these indicators largely lose explanatory power.

As bad health prevents often from active social participation, we subsume *health* conditions under this category: Gray et al. (1996) analyzing attrition in a survey of health and life style in Great Britain, state that "those characteristics which were found to be related to attrition ... are

smokers, the less sporting and those who did not feel a part of the community" (p. 171). However, there was "little or no relationship between the health and psychological variables and a person's conscious decision to participate ..." (p. 182).

With respect to *topic interests* and *motivational* factors, in cross-sectional analyses little political interest and social participation and many "don't know" answers are shown to be strongly correlated with little political knowledge and weakly pronounced attitudes of the individuals as well as a general negative attitude toward surveys (Stocké/Stark 2005). Such (non)response behavior can be considered as resulting from a lack of cognitive efforts and disinterest toward the survey (Pickery/Loosveldt/Carton 2001; Loosveldt/Pickery/Billiet 2002, Schräpler 2004, Stocké/Stark 2005). The within household response rate is a good indicator for household specific motivation as according to Watson and Wooden (2004), in the HILDA and in the BHPS surveys, "in line with the results ... for the BHPS, we see that coming from a partially responding household is a major risk factor for non-participation at the next wave" (p. 302).

Loosveldt/Carton (1997), analyzing the respondent's decision to participate in the second wave of a Flemish election panel survey, find that the ability to provide an answer during the first interview plays a crucial role. Respondents who have problems to answer the questions and are difficult to interview are more likely to refuse to be interviewed in the second wave. The respondent's knowledge about the surveyed aspects and reasons for a survey is therefore crucial for panel participation. This correlates with the experience of a "pleasant" interview during the first panel wave, which seems to be an important issue for further panel stay (Loosveldt/Pickery/ Billiet 2002).

As to the answers given to subjective categorical questions, Pickery/Loosveldt (2004) view the non-occurrence of at least some extreme category answers as proving a low interview quality, because "One can expect that even respondents without a pronounced opinion will use the extreme response options now and then, especially when different scales are considered. If they do not, they probably do not expend the effort required. ... this is a form of satisficing" (p. 9). Similar results can be concluded with respect to the use of the midpoint category (see e.g. Tourangeau/Rasinski 1988). Scherpenzeel (2002) considers an excessive use of middle category answers as a proof of a low motivation to conduct the survey.

Regarding *panel specific aspects*, in the US Panel Study of Income Dynamics (PSID), the cross sectional representativeness seems to remain "roughly intact" (Fitzgerald et al. 1998: 251). However there is evidence that attrition is correlated with higher levels of "turnover and stability in earnings, marital status, and geographical mobility" (op. cit., p. 296). Also Watson/Wooden (2004) find more attritors among those in the HILDA panel who change their address more often.

With few exceptions, in the literature, only two panel waves are used in order to analyze panel attrition.⁴ As we are especially interested in the stability of the attrition variables across waves, we model the successive transitions between waves, but do also built a longitudinal all-wave model.

4 One exception is Rendtel (2002), who uses econometric models to analyze whether attrition is missing at random.

Specifically the article is organized as follows: First, we present the Swiss Household Panel (SHP), the data used for the analysis. To get a better impression on magnitude and selectivity of nonresponse and attrition in the SHP we describe the first wave nonresponse process, before we compare the distributions of the first wave respondents and its stayer subset after five waves with those in the BHPS and the ECHP. Next the modelling variables used are described in more detail. In a first modelling approach, these variables are used in a year to year attrition analysis. Here we will in particular investigate which variables are significant and whether the significant variables are cumulative rather than compensative as regards to attrition. Next a longitudinal model is built and analyzed. Most importantly, wave interaction terms will show whether certain covariates deviate from the base attrition model in specific panel waves. The results are discussed before the last section concludes. Note that we do not consider interviewer effects on nonresponse in this work.⁵

2 Data: The Swiss Household Panel

In this work we use data from the Swiss Household Panel (SHP), an ongoing, nationwide, yearly conducted, centralised CATI panel survey on the Swiss residential population. Questions are about household composition and socio-demographics, health, well being and attitudes, politics, social networks, and economics. The SHP started in 1999 with slightly more than 5000 households. In the SHP, in each year first the household composition together with the relationships between all household members, and the basic socio-demography is asked of the household reference person in the grid questionnaire. The household reference person is an adult who is sufficiently knowledgeable of the household characteristics, including the household finances. The grid questionnaire completion takes three to ten minutes, depending on household size and complexity of relationships. Then, a household related questionnaire is to be completed (about 10 minutes), again by the reference person. After this information is given, each household member from the age of 14 on has to complete his/her own individual questionnaire (about 35 minutes).

2.1 First wave nonresponse

In Switzerland, survey analysts and researchers face comparatively high nonresponse rates⁶, and subsequent attrition in the case of a panel survey. In the first wave (1999), questionnaire response in the SHP is as follows, in the different steps (MIS-Trend 2000):

⁵ An attrition analysis using the SHP together with interviewer characteristics can be found in Lipps (2006b).

⁶ See for a cross-country comparison of the response rates of e.g. the European Social Survey (ESS) Stoop 2005. Switzerland ranks at the very bottom within all countries involved in the ESS. A probable reason for the high nonresponse rate might be over-surveying in Switzerland, see Budowski/Scherpenzeel (2005) for the special case of the SHP. Note that similar to Nicoletti/Peracchi (2005), if we talk about nonresponse in the first wave, we distinguish between noncontact and refusal.

1. out of the 14,174 (gross) addresses drawn from the national telephone register and called by the interviewers, 1,025 were no valid telephone numbers (fax etc.). This leaves 13,149 net addresses.
2. out of the 13,149 net addresses, 1,065 could not be reached (i.e. 8.1% non contact rate).
3. out of the 12,084 contacted households, 2,712 (22.5%) are non-sample cases (i.e. business lines, language problems, etc.), 2,309 of the remaining 9,366 households (24.7%) refused to complete the grid questionnaire.
4. out of the 7,057 households who completed the grid questionnaire, 1,062 (15.0%) refused to complete the household main questionnaire.
5. out of the remaining 5,995 households, in 921 households (15.4%) all individuals refused to complete their individual questionnaire.

This leaves us with a household net response rate of 48.6% (5,074 "completed" households of 10,437 sample households), i.e. the grid and household questionnaires are completed and at least one household member filed his/her individual questionnaire.

On the individual level, according to the screening results from the household grid questionnaire, there are 10,293 individuals living in the 5,074 participating households. Of these, 921 (9.0%) are non-sample cases (language problems, illness, etc.). Of the remaining 9,372 persons, 1,573 (16.8%) refused, leaving a sample of 7,799 respondents.

Because, apart from the geographical region, there is no information on the gross sample, sample selectivity can in principle only be calculated using information of the households who completed the grid questionnaire. Based on the screened households, it can be shown that foreign households are underrepresented. Within households, males, younger individuals, and again persons with foreign nationality answer to the survey in a worse way (Cornali/Vonlanthen 2001).

In all it can be assumed that due to nonresponse, in the first SHP wave especially foreign individuals are underrepresented to a quite strong degree.

2.2 Attrition in the SHP compared with other panel surveys

Despite various measures to motivate panel participants (Budowski/Scherpenzeel 2005), the SHP faces a relatively high attrition of around 17% per year. This figure is higher than in other well established large (mostly CAPI) panels like the German SOEP (e.g. Kroh/Spiess 2005), the British BHPS (e.g. Burton et al. 2004) or the US PSID⁷. However we talk about attrition in a comparatively restrictive longitudinal manner: we only include persons who already answered the individual questionnaire in the first wave, and thus – other than sometimes done in other panels – do not include any new entrants into the panel⁸. Nevertheless, e.g. the first sample in the SOEP faces a longitudinal attrition of 10% during the transition from wave 1 (in 1984) to wave 2, 7% from

7 See the various articles in the *Journal of Human Resources* 33 (2), Special Issue: Attrition in Longitudinal Surveys, 1998.

8 These concern new household members who are therefore not original or longitudinal panel members (Naud/Latouche 2001).

wave 2 to wave 3, 5% from wave three to wave 4, and declines to around 2% in the long term (Kroh/Spiess 2005: 21). Similarly, the PSID has an attrition of 12% from wave 1 (in 1968) to wave 2, and about 3% in the years to follow (Fitzgerald et al. 1998: 254). Also in the BHPS, after an attrition of longitudinal first wave (in 1991) respondents of around 12%, attrition reduced to less than 5% from wave three on (Burton et al. 2004: 4).

We first compare some important distributions of the SHP total original and five waves stayers sample, with those from the BHPS (Lynn et al. 2006). The BHPS started in 1991 and was an example for the SHP with respect to design and content. However the BHPS interviews are conducted face-to-face. In order to have comparable samples, we compare the total 1999 sample persons with those who validly report during all five waves between 1999 and 2003 in the SHP. Also we drop all individuals who become (known) nonsample cases within this time period. We have the following sample sizes:

Sample	SHP	BHPS
# Respondents eligible in all waves until wave 5	7654	10264
# Participants first wave, with all waves until wave 5	3891	7246
First 5 wave response rate [%]	50.8	70.6

The attrition in the SHP is almost 20% points higher than in the BHPS.

Sex	SHP all	SHP 5w	BHPS all	BHPS 5w
Proportion of men [%]	43.6	42.3	47.7	46.2

With about 1.4% point differences between the men's share in the total and the stayer sample, the differences are about the same in both surveys.

Age [%]	SHP all	SHP 5w	BHPS all	BHPS 5w
14 (BHPS: 16) - 24	15.2	10.4	15.9	14.6
25-34	19.0	17.8	19.1	20.0
35-44	23.2	25.7	17.5	19.1
45-54	18.9	20.9	14.5	15.0
55-64	12.2	13.7	12.9	13.3
65-74	8.1	8.5	12.1	11.9
75+	3.4	3.0	8.0	6.1

The differences with respect to (starting) age groups are considerable between the SHP 1999 stayer and total sample on one hand, and the BHPS 5 wave respondents and total sample on the other. In the SHP the selection is mostly due to the youngest age class. This may be an indicator of problems with tracing of movers by the survey agency.

Marital Status [%]	SHP all	SHP 5w	BHPS all	BHPS 5w
Divorced or separated	6.7	6.7	5.7	5.8
Living as couple	7.4	6.6	6.3	6.4
Married	57.8	63.4	58.3	61.0
Never married	23.7	19.1	20.7	18.6
Widowed	4.5	4.3	9.1	8.2

The differences in the marital status between the 1999 five waves stayer sample and the 1999 total sample in the SHP on one hand, and the 1991 total sample and those, who responded all waves until wave five in the BHPS on the other, while higher in the SHP, are not tremendous.

Education [%]	SHP all	SHP 5w	BHPS all	BHPS 5w
High (Degree)	31.2	34.6	23.3	25.8
Middle (Level, Other)	47.5	47.3	41.4	42.2
Low/ No Qualification	21.3	18.1	34.7	31.4

The SHP and BHPS differences in percentage points between the total and stayer samples with respect to education are about the same.

Household Size [%]	SHP all	SHP 5w	BHPS all	BHPS 5w
1 PHH	17.4	16.8	13.7	13.1
2 PHH	30.0	29.5	33.4	33.7
3 PHH	15.5	14.6	20.4	20.4
4+ PHH	37.2	39.1	32.5	32.8

Compared to the BHPS, larger households are slightly overrepresented in the SHP after five waves.

Household Income: Quintiles	SHP all	SHP 5w	BHPS all	BHPS 5w
Lowest	20.0	16.7	20.0	17.5
2	20.0	19.8	20.0	19.2
3	20.0	20.7	20.0	20.8
4	20.0	21.1	20.0	20.9
Highest	20.0	21.4	20.0	21.6

As to income quintiles, the SHP distribution is not very different from that of the BHPS.

General Health	SHP all	SHP 5w	BHPS all	BHPS 5w
Very well	33.5	34.0	28.2	29.2
Well	50.4	51.7	45.0	45.7
Average	13.8	12.7	18.6	17.7
Bad	2.0	1.6	6.2	5.6
Very bad	0.2	0	2.0	1.7

Both distribution differences are similar.

Qualitatively similar results to those of the BHPS are reported from other panel surveys (e.g. the US PSID Fitzgerald et al. 1998). Generally, it appears that – given the much higher attrition in the SHP – higher attrition in the SHP does not automatically mean higher (cross sectional) selectivity. One exception is the higher drop out of younger persons.

In the following, we compare the most important socio-demographic attrition ratios (proportion in total sample / proportion in stayer sample after five waves) with those of the ECHP. For the latter, the attrition ratios from the middle 80 percentile countries are shown, omitting the lower and upper 10%. The ratios of the first and the last waves are depicted, where last wave means between third and fifth wave, depending on ECHP country.

Figure 1 Attrition ratios (proportion in total sample / proportion in stayer sample after 5 waves) in the European Community Household Panel, Swiss Household Panel, and British Household Panel Survey

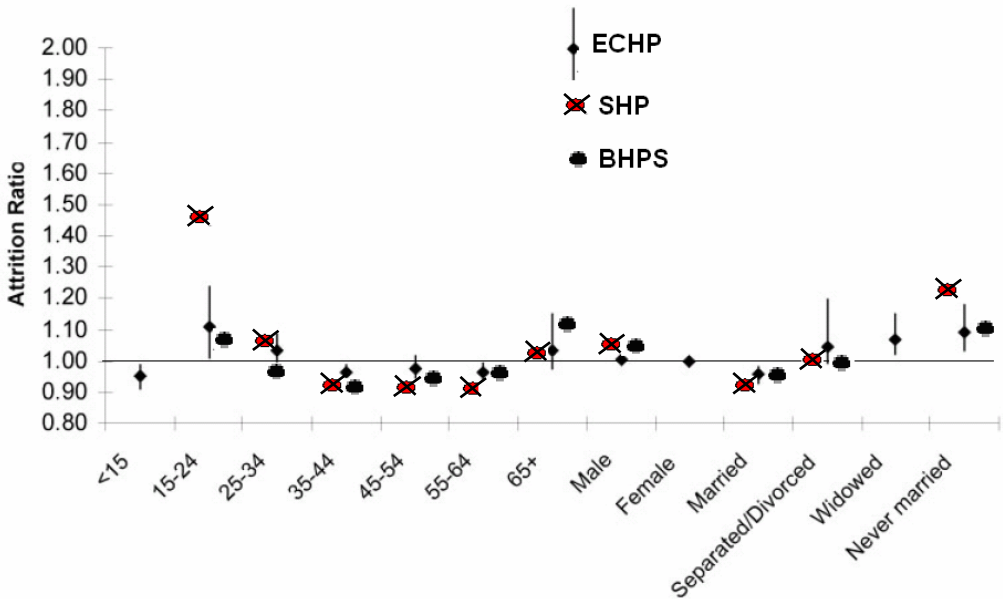


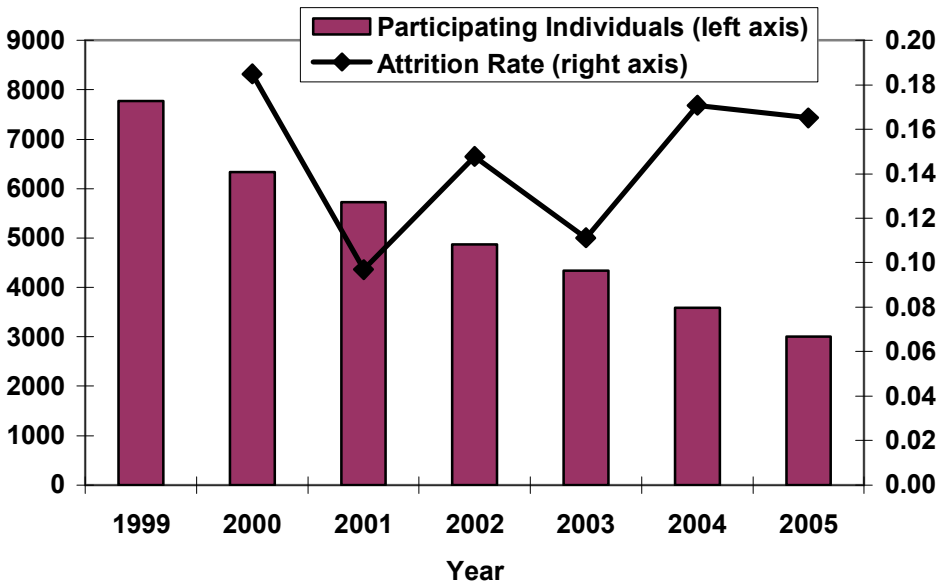
Figure taken from: Watson (2003), Figure 1.

Again, the problem to keep younger people in the sample becomes apparent.

3 Panel Survival in the SHP

The longitudinal sample in the SHP, which is still interview eligible in the next wave, started in 1999 with 7769 individuals. In 2000, this sample size drops to 6333, to 5719 in 2001, to 4874 in 2002, to 4332 in 2003, 3592 individuals in 2004, and finally ends up with 2999 in 2005. We depict the SHP wave specific number of participating individuals together with the attrition rates in Figure 2.

Figure 2 Number of participating eligible first wave individuals and attrition rates in the Swiss Household Panel, wave 2 (2000) through wave 7 (2005)



The main problem of the SHP is that the attrition rate does not decline: Although the attrition in the second wave is comparatively high, it is not outrageous, especially taking into account an "oversurveying" effect prevalent in Switzerland (Zimmermann/Joye 2003) with harmful effects on response rates and presumably attrition.

We like to assess the consequences of the two major panel specific "events" in the history of the SHP:

- The biographical questionnaire, a P&P self completion sent to the respondents in May 2002 (Budowski/Scherpenzeel 2005). A small part of the sample was used for the 2001 pretest, but this concerned only around one sixth of the whole sample.
- To notify the respondents of a duration of the panel survey of five years, before the first wave started. This was the time horizon of the initial project funding, which the respondents were deliberately told (Budowski/Scherpenzeel 2005).

Although the 2001 pretest of the biographical questionnaire did not show any adverse effects toward the SHP CATI response rate in the next wave (Scherpenzeel et al. 2002), we are now in a position to analyze effects from the biographical main questionnaire. In terms of the "five wave announcement", we expect a negative influence on those who were difficult to convince to take part in the first five waves, and who might have an argument to drop out in the sixth wave. Remarks noted by the interviewers while asking the household grid questionnaire during the sixth wave like "In the beginning it has been told that the survey lasts five years and I already took part for five waves but have enough now" supports this hypothesis.

Apart from the expected high attrition in the second wave (2000) we find consequently two peaks in Figure 2, in 2002 and in 2004. These coincide with the "events" in the SHP. We therefore find the expected higher attrition rates supposedly due to the biographical questionnaire and the "five wave announcement". The all wave model to be discussed later will give more insight in the covariate influence on attrition in these particular two waves.

In the following attrition analysis we combine all kinds of possible drop-outs, i.e. due to refusals, non contacts, or others (De Keulenaer 2004). The reason for this decision is first that in a CATI survey like the SHP, from the second wave on, non-contact is a minor problem compared to refusal at least regarding its magnitude. This is also due to the easier respondent tracing by the survey agency based on the information from previous waves. Secondly, a true refusal may easily be confused with a noncontact: this may be because the respondent is alerted by the advance letter announcing the survey call some days before and therefore does not answer the phone once the expected telephone number appears on the display. Moreover, it happens sometimes that a respondent Y disowns another eligible member X in the household, telling that X is not available, on X's behalf. What is usually coded noncontact is a true refusal. In addition, a metadata comparison of the characteristics of those who refuse and those who did not continue to respond due to other reasons shows that both groups are not very different with the exception of age and household size (Gray et al. 1996, Table 1). We nevertheless include covariates which can be expected to be strongly related to noncontact rather than refusal, such like age, or whether the household expects to move in the next 12 months, if available. With respect to the former, we already realized that young adults drop out of the SHP to a higher extent which points to problems of tracing moving households.

4 Independent Variables

We model attrition with the help of a bundle of *socio-demographic* variables on one hand, including the household composition (number of adults 18 years or older, number of children under the age of 18), sex, age⁹ in seven groups (14-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70+), whether the individual is married, education on a binary scale (median cut), and finally the employment status, i.e. full time or part time employed, unemployed, or out of the labour force.

We analyze the influence of having Swiss citizenship, and the interview language. The latter variable is also dichotomized, as within the three SHP survey languages German, French and Italian, about 73% of the Swiss residents speak German as first language (Swiss Federal Statistical Office 2005). We further distinguish between the seven Swiss regions "Lake of Geneva", "Middeland", "North-West Switzerland", "East Switzerland", "Central Switzerland", "Zurich", and "Ticino". In addition we investigate the size of the community in which the respondent lives, measured by a binary variable which amounts to 1 if the respondent lives in a large or middle sized community ("Grosszentrum" or "Mittelzentrum"), and 0 else.

Also whether the household moved since the last panel wave is taken into account. Moving is an important predictor of the odds to making contact with a household. However it is a priori not clear whether moving has an influence on response, once contact is established. In the HILDA survey at least, the likelihood of obtaining an interview is independent of moving. In order to assess whether the survey institute successfully tracks households, the intention to move is taken into account in the attrition model as well.

In order to measure panel motivation using information of the degree of *social isolation*, we include house ownership as this variable was found to discriminate grid response (Naud/Latouche 2001). In order to approach disposable income – a direct use of income is not possible because the missing values are not (yet) imputed in the SHP, a variable which counts various potential bad states of the dwelling (6 at maximum) as well as flat or house ownership is used.

Next we investigate a bundle of satisfaction variables; all satisfaction variables are equally measured on an 11pt scale, where 0 means completely unsatisfied, and 10 means completely satisfied:

- satisfaction with the financial situation of the household
- satisfaction with living together with the other household members or with living alone, respectively
- satisfaction with the activities in the free time
- satisfaction with the amount of leisure time

These satisfaction measures are standardised and then combined into an aggregate parameter.¹⁰

⁹ Age is measured in 1999 and kept constant afterwards, i.e. we measure initial age.

¹⁰ Worth mentioning is that because of the aggregation, we encounter only few missing values due to item non-response: a variable containing a missing value is simply not considered for the individual concerned for the mean value calculation. The mean parameter consists then of fewer variables.

Health reasons are very often stated when people argue why they do not like to continue to take part. In order to avoid collinearity, we combine the following (standardised) health related variables into one aggregate parameter ("health problems") which is the mean of the following variables:

- the degree to which the self rated health is bad
- whether at least on one day during the last years health problems were encountered
- whether there are impediments in everyday activities due to health problems
- satisfaction with health
- whether medications are needed
- the degree to which the person feels anxious in terms of her health

The extent to which health has improved during the last 12 months is not added to this aggregated health parameter, but kept as a single *health change* measure.

As to the *topic interest and motivational* factors, we investigate a series of variables which are a measure of societal and political interest and participation. We consider in more detail the variables, which are also originally measured on an 11pt scale

- interest in politics
- in degree to which the respondent has trust in the federal government (compare Stocké/ Stark 2005)
- the self assessment of his or her political influence
- and the number of times one would go to ten possible votes.

These variables enter a common parameter "political interest".

In order to first distinguish the rather theoretical parameter political interest from actual or potential political participation and because a correlation analysis shows that the variables between the two groups correlate only rather weakly, we define a second aggregated political parameter "political participation", which is the mean of the following standardised variables:

- the extent one is willing to take part at demonstrations
- the degree one would take part at strikes
- the extent one would participate at boycotts

We furthermore include the political left-right political orientation. Also this variables is standardised. We further consider whether the individual is active in voluntary work and does sports at least once a week.

As *survey related motivation variables*, we include the household response rate from the preceding wave. Furthermore, we introduce the dummy "reference person" from the last year in multi-adult households, as Lipps (2006b) shows that response propensities of former reference persons are much higher than of other persons in the household.

Next, we include variables measuring the interview quality of the preceding wave. The variables indicate whether at least one of the 23 subjective attitude questions present in all waves has not been validly answered (subjective questions noanswer), the number of extreme and middle category answers to these questions, as well as not providing enough information for the data editor to be able to calculate total individual income.

As to the extreme categories, we suspect that not only an underuse, but also an overuse of extreme categories may be a form of satisficing and therefore include the number of all extremes in the data. The same is done for the midpoint (cat 5) category.

In order to avoid deletion of records due to missing values other than the validly coded INR categories "don't know" or "no answer", the (few) missing values are recoded to the respective modal value.

5 Single Waves Models

The single wave models aim to getting an idea which person groups do especially attrite in which wave. In each single wave model, we include all longitudinal persons who give a valid interview in the first of the two transition waves under consideration and are still interview eligible in the second wave. As we are especially interested in the identification of even weakly significant attrition variables, we build logistic forward regression models with a comparatively small inclusion level equal to .01. As mentioned above, we consider whether the household intends to move within the next twelve months in these single wave models. This variable is not available in the years 2000 and 2002. To interpret the coefficients and their significance notice that they are not comparable due to the different sample sizes of the models.

The results of the forward regression models are depicted in the left columns of Table 1 and Table 2. To facilitate an overview, we denote in Table 1 only the significant variables, with a plus sign if the variable correlates positively with attrition in the wave considered, or a minus sign if the variable correlates negatively with attrition in this wave. The full coefficients for the significant variables at the 1% level are listed in Table 2.

We first compare significant variables in the different variable groups possibly susceptible for attrition. Evidently there are large differences: within *socio-demography* especially moving factors and (young) age are crucial. Nationalities other than Swiss show higher attrition rates, but only in the second wave. Spatial issues thus are not of major importance as long as they do not measure the main language regions. In the *social isolation* variable group, only satisfaction is important, while housing does not play a role at all. *Topic interest and motivation* play a major role in all waves, as well as *survey status*. That health problems are of minor importance in *each* wave is surprising, because health problems are often a main reason for individual refusal, as far as reasons for dropping out are given in the grid questionnaire.

A second immediate notion is that if an attrition variable is significant in several waves, attrition is always cumulative rather than compensating. This is consistent with findings in the literature (e.g. Gray et al. 1996). In addition the magnitudes are rather stable over time, as can be seen in Table 2. Thirdly we notice that the pseudo R^2 statistics range between .05 are thus not tremendously high. This shows that, although we included many covariates trying to explain attrition variation across different variable groups derived from theory, there are still other reasons responsible.

In the following, we identify and interpret the selective effects in the single transition models.

As to the *socio-demographic* variables, there are no particularly surprising results. The number of adults in a household does not discriminate attrition until the year 2004. In this year, persons living in households with two (or more) adults attrite way above average. This may be due to the above stated "five wave announcement". Households with several adults may be more sensitive to such announcements, perhaps more so because they face a higher response burden due to having to answer several individual questionnaires.

For the variable number of children in the household on the other hand, we find negative effects as regards to attrition in the first and the third transition. An explanation is that households with children have a more stable lifestyle, and are much easier to be found and contacted. After four waves however, the remaining households in the panel and the remaining family households seems to be in "balance" insofar, as there is no difference in the attrition rate from wave five on.

The same stability argument applies for the middle aged groups between 50 and 59 years of age, and for the married persons; for the former there is a negative attrition effect in the second and especially the fourth wave, which further cumulates in the sixth wave. Very severely however, the adolescent individuals and particularly the younger adults attrite to a very high degree constantly from the second wave on. With respect to age distribution, this may lead to an "overaging" of the panel sample in later panel waves. This high attrition is an alarming signal regarding tracing of moving respondents, as moving is more prevalent in this age group. This finding is strengthened by the very high attrition rate among those who intend to move within the next 12 months. As can be seen in Table 2, the odds to attrite of the "willing to move" people do not decrease over waves; i.e., tracing efforts undertaken are not increasingly efficient.

As to the older cohort aged 70 and older, we encounter a higher attrition in the second wave which does not continue later. This is surprising, as due to increasingly bad health, deceases, institutionalisation, or simply a too high response burden, one might expect a constantly higher attrition in this age group. Their higher stability in life seems to play a higher role than a higher "natural" transition probability towards ineligibility.

Also unanticipated is that education or being full time employed or jobless is never significant. This may be a result from a conflict between the higher interest in the topic by higher educated or full time employed people and their tougher time budget. That the unemployed do not show a higher attrition rate could not be expected from the literature. In fact the attrition is as high as for the reference group, which consists of those who are not in the labour force. In this respect, both interest in the survey and response burden seem to be important factors. The contrary may hold for the part time employed: they show a smaller attrition in the third and especially in the sixth wave, as response burden may play a minor role for this group.

Investigating nationality, Swiss citizens attrite to a smaller extent, as can be expected from other panel surveys. Swiss-German speaking people show a high risk to attrite only in wave five.

This partially complements the slightly higher attrition rate of the East-Swiss who all belong to the German part of Switzerland in the third wave. Second, it may result from an institution effect: the "five wave announcement" may have been communicated more explicitly in the German speaking CATI centre compared to the French speaking centre.

Not surprisingly, the intention to move decreases the odds of a contact and therefore increases the probability of attrition. Households who moved since the last interview show a significantly higher participation rate: this is probably due to the fact that the propensity to move right again is smaller for these households.

Concerning *social isolation* factors, housing variables, which can be used as weak proxies for wealth (ownership) and income (state of housing), do not play a role at all. This comes as a surprise. Similarly, neither health problems nor health improvements largely affect attrition in the subsequent wave. This fits well to the non-increasing attrition of the elderly after the second wave and shows that health per se does not affect attrition. On the other hand, the aggregated satisfaction parameter is significant through the first waves.

The most interesting effects stem from the variables measuring *topic interest and motivation*: expectedly, being interested in politics and potentially participating in political or societal activities largely decrease the odds to attrite. This is partially also true for involvement in voluntary work. Having a left rather than a conservative political orientation on the other hand has no effects. Overall, the lowest attrition can be expected from those with a high political interest. This pattern holds virtually during all panel waves.

The timing of the influence is also interesting: those who are involved in voluntary work exhibit a decreased attrition only from wave four on, whereas individuals who participate in politics show a particularly low attrition in the second and third waves. Perhaps the latter do act more immediately and to a stronger degree.

Regarding the data quality characteristics of the interviews preceding the wave under investigation, especially those who use many extreme categories answers to the subjective questions have highly positive odds to attrite from wave three on. In fact, this intra-individually rather stable variable¹¹ seems to be an excellent measure to assess attrition in the next wave, and does not correlate high with the other variables considered. A possible interpretation for the strong effect on attrition is that giving a high number of extreme categories answers is an indicator of little substantive interest in the survey. A similar albeit much weaker result holds for those who give a high number of middle category answers. The latter effect is however prevalent only in the fifth panel wave.

Not giving a valid answer to at least one of the subjective questions has no significant effect at all; however a not valid answer to one of the income questions has strong positive attrition effects in the second wave. This should have positive consequences on the income nonresponse in subsequent waves.

11 The correlation coefficient between two waves never falls below the value of .5.

Finally a high within household response rate leads to a constantly highly significant lower attrition in the next wave. This confirms that other household members' disposition in a preceding panel wave has strong impacts on the own participation behavior (Lipps 2006).

Similarly one might wonder why the reference person of the previous wave, who has to answer the household grid and preferably the household questionnaire, attrites to a smaller extent than other persons in the household. On one hand, these tasks speak in favour of the hypotheses that her commitment to the panel is from the beginning stronger than those of other individuals. However, all characteristics are measured in the year before the possible attrition under investigation occurs: It may equally be true that the previous year's reference person suffered such a high response burden due to not only having completed the grid and household questionnaire, but also her own individual questionnaire that she is more likely to attrite. Nevertheless we find a cumulative negative attrition of the reference person, so the first hypothesis is confirmed.

We note in addition that the 2002 and the 2004 ("panel events") models differ only in some minor respects from the other models: as to the "five year announcement", in 2004 there is by and large a higher attrition especially by those who live together with other adults, a lower for part time employed and again persons engaged in voluntary work. A possible interpretation may be that especially those with a higher household specific survey burden have been especially bothered by continuing the panel despite the "five year announcement". However these findings should be interpreted carefully.

6 All Waves Model

In the second modelling step we are especially interested in testing for duration dependence, i.e. all things equal, we try to identify person groups for whom the base attrition rate differs and, in addition, whether this base rate is different in single waves or even shows a monotonous development over time. Second we like to identify potential effects of the two panel "events" biographic survey" and "five wave announcement" in wave four (2002) and wave six (2004), respectively, in the context of *all* panel waves.

In the SHP the decision is made to keep all persons in the sample who temporary refuse to take part, i.e., refusal only in one wave. Once an individual refuses for two consecutive waves, (s)he is excluded from further contact attempts. Because we like to keep all interview eligible individuals including the temporary attritors in the analysis, we cannot apply a true survival model.¹² Nevertheless, it is important to control for the clustering of waves within individuals when duration dependence is tested¹³ (Zabel 1998). Therefore we apply a two-level random effects model, thus treating the single individual residuals as random variables. This controlling constitutes the

12 See Lipps (2006a) for an attrition analysis of the SHP using only individuals with monotonous participation patterns.

13 I.e., all individuals contribute to the same extent, irrespective of their panel participation duration.

main difference vis-à-vis the single wave models, where significances depend on the sample sizes, which vary considerably between waves. Note in addition that we cannot estimate a random effect forward all wave model. Thus in this stage all variables are included, not only the significant ones. This may have implication on co-varying variables.

The qualitative results of the all wave model are depicted in the right columns of Table 1, the odds ratios of all coefficients in the right columns of Table 2.

Looking at the modelling results at the right columns of Table 1, it becomes clear that only few of the variables considered are significant in terms of a wave specific deviation from the base attrition rate. This means that only few person characteristics which discriminate attrition change over waves. In addition the significance of these "deviance variables" reaches the 1‰ level only in the case of the satisfaction measure in wave six. This reflects the stability of the base attrition rate over the waves, i.e. time is cumulative rather than compensating. E.g. people who are engaged in voluntary work attrite to a lesser extent constantly in every wave. That the high initial attrition does not significantly decrease over time can be seen by the insignificant wave specific effects.

There are some wave specific peculiarities vis-à-vis the results of the single-wave models. E.g., being married or part time employed has transition specific effects in the single wave models. However these effects completely vanish in the all wave model. These variables are captured in other now included variables, see the above remark about co-varying independent variables. Conversely, having health problems, then without effects, do significantly increase the odds of attrition in the all wave model. Overall however, in the all wave model, the base effect is "stabilised".

As we are especially interested in the effects of the panel events "biographical questionnaire" and "five wave announcement", we check the 2002 and 2004 columns in more detail. As to the fourth wave attrition effects, we identify a comparatively higher attrition by those who show a higher political participation, or are reference persons. Both effects affect the highly negative base attrition with respect to these characteristics in a positive way. This shows that person groups, who generally show smaller attrition rates, are particularly deterred by the additional burden. Regarding the "five year announcement" effects on attrition in 2004, we find a highly significant increased attrition rate for those who are more satisfied with various aspects in their lives. Again this particular wave effect compensate for the small base attrition rate of more satisfied individuals. These persons may have also attrited to a higher rate due to the higher response burden, because of their tougher disposable time budget.

Overall we find that individuals who generally show a higher panel loyalty attrite to a higher extent due to the "events" considered. This may prove their sensitivity toward additional survey burdens whose possible effects on future attrition rates should be carefully analyzed before they are implemented.

7 Summary and Conclusions

In this article we analyze attrition in the Swiss Household Panel (SHP) from wave two (2000) through wave seven (2005). We only include individuals, who already completed the individual questionnaire in the first wave, and are still interview eligible in the wave under consideration.

First, comparing attrition in the SHP with that in the British Household Panel and the European Community Household Panel, we show that although attrition is comparatively high in the SHP, it is not particularly selective with respect to important socio-demographic or -economic variables. However the problem to keep younger individuals in the sample is a challenge for the SHP – the more that this is the person group which moves and forms new households, thereby maintaining the (cross-sectional) sample size in the panel survey.

We use the characteristics of the respondent in the preceding wave as covariates to model independent logistic forward regression transition models in a first step. We find that the younger people, those without children in the households, those who intend to move, foreigners, those living in households with interview refusing participants or showing little interest and (potential) participation in politics and society, those dissatisfied with various aspects in life, and those who are not reference person in their household attrite to a higher degree than their respective counterparts. Only very weak effects are due to spatial aspects and the housing situation of the respondents, as well as their health status or physical activities exerted.

These findings are in line with attrition analysis results from other European Panel surveys (Buck et al. 2003; Watson 2003) and confirms the "social exclusion" theory (Groves/Couper 1998; Groves et al. 2004; Stoop 2005). In addition we find strong effects from interview quality characteristics in that those who exhibit an extreme answering behavior (overuse of extreme categories answers) or tend to refuse to answer income questions also attrite to a higher rate. An assumed satisficing behavior (overuse of middle category answers) or proving little cognitive effort invested in the answers (not answering the subjective questions) is not necessarily related to a higher attrition. The effects are in all models cumulative rather than compensative.

In the second step an all wave random effects model with wave interaction terms is estimated. We find that the base model is rather similar to a synopsis of the single wave models, and that the effects of the wave interactions are minor. In particular, although attrition in the waves with the two specific panel "events"¹⁴ is higher, there are neither significantly increased attrition effects from the two wave dummies nor a particularly increased attrition by special person groups. The small deviations from the base attrition in the two "event" years are comparatively small compensatory effects: those who generally show a smaller attrition are positively affected and vice versa. In general however, the mostly insignificant wave interaction effects show that the panel participants are affected to more or less a similar degree.

14 First the biographic survey in 2002 and second the assumed end of the panel due to communicating to the respondents that the panel is initially funded for five years at the start of the survey in 1999.

Our models have a comparatively small explanatory power. This shows that other than easily measurable factors used here from completed household or individual interviews also play an important role with respect to attrition behavior. The quality of the contacts of interviewers with respondents prior to an interview can give some hints for future research: E.g., while the respondent socio-demography is significant for the outcome of the first contact with an interviewer, Groves/Couper show that it loses its predictive power for those requiring more than one contact to obtain a final disposition (1996: 74, 1998: 255). First analyses to better understand the process leading to attrition are currently under way (see Lipps 2007), who uses call data from the SHP.

In order to reduce the high attrition the SHP, a couple of measures were taken for the 2006 wave (MIS-Trend 2007), partially based on the findings in this article: most importantly, an incentive experiment has been implemented among panel households¹⁵ in order to increase motivation. In addition, unlike the rule adopted in the SHP not to ask households who refused to participate for two consecutive waves, households, who did not answer during the 2004 and the 2005 waves, have been approached all the same. Finally, the notion of completed households has been changed¹⁶. First results show that these measures decreased attrition in the 2006 wave to a considerable extent.

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- 15 A random quarter of households received 1.) no incentives (control group), 2.) stamps unconditionally, 3.) participation at a lottery or 4.) a donation to be donated to a charity institution. 3.) and 4.) applied on the individual level after completion of the individual interview (conditional). Also incentives for interviewers have been implemented depending on collective response rate achievements.
- 16 Before the 2006 wave, a household has been considered „complete“ if the household grid and at least one individual interview was filled. From wave 2006 on, completeness means that all interview eligible household members complete their interview. The idea was to increase cooperation among those who are not reference persons in the household.

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Appendix

Table 1 "Qualitative" influence on attrition

	Single Wave Models (single transitions)						All Wave Model (indiv. clustering controlled)					
	2000	2001	2002	2003	2004	2005	base	+2001	+2002	+2003	+2004	+2005
Wave effect (only all wave model)							Ref.					
SOCIO-DEMOGRAPHY												
Number of adults in household					++							
Number of kids in household	--		--				--					
Male	++						++					
age14-19	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Reference category					
age20-29	++	++	+									
age30-39						++	--					
age40-49							--					
age50-59	-		--		-		--					
age60-69			-				--					
age70-	+											
Married		--	-									
Education high												
Full time employed												
Part time employed		-			--							
Unemployed												
Swiss Citizen	--						--					
Language Swiss German				++						+		
Lake Geneva	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Reference category					
Middleland										Only base effect		
North-West CH										Only base effect		
Zurich										Only base effect		
East-CH		+								Only base effect		
Central CH										Only base effect		
Ticino										Only base effect		
Lives in Urban Centre												
Household moved within last 12 months	--	--	--	--	--	--	--					
Household has intention to move within next 12 months	.	++	.	++	++	++	.	.	.	.	.	.
SOCIAL ISOLATION												
House bad												
House owner												
Satisfaction with various aspects	--	-	-				--				++	
HEALTH												
Health Problems							++	-				
Health improved during last 12 months												
Do_sports				--						-		
TOPIC INTEREST AND MOTIVATION												
Engaged in voluntary work			-		-		-					
(Potential) Political Participation	--	--					--		+			
Political Left orientation							-					
Political interest	--		--	--	--	--	--					
Subjective questions noanswer												
Number of extreme categories		++	++	+			++					
Number of middle categories				+								
Income noanswer	++						++					
Response rate within household	--	--	--	--	--	--	--					
SURVEY STATUS OF INDIVIDUAL												
Person is Reference Person (only more-adult-HH)	--	--		--	-	-	--		+			
N	7769	6333	5719	4874	4332	3592	N=32619, p=0.20 (Intra-cluster coeff.)					
MCFadden Pseudo R ²	0.068	0.064	0.057	0.053	0.045	0.055	-					
LR chi ²	506	331	309	212	209	176	Wald chi ² (Deg. Freedom=180)					1485

"+"=positive, 1% significance level, ++=positive, 1% significance level, "-"=negative, 1% significance level, --=negative, 1% significance level. "."= n.a. Single wave models: forward regression. All wave model: only significant (1%) effects indicated.

Table 2 "Quantitative" influence on attrition

	Single Wave Models (single transitions)						All Wave Model (indiv. clustering controlled)					
	2000	2001	2002	2003	2004	2005	base	+2001	+2002	+2003	+2004	+2005
Wave effect (only all wave model)							Ref.	.83	.88	.38	1.17	.97
SOCIO-DEMOGRAPHY												
Number of adults in household					1.19		1.05	.94	.97	1.02	1.13	1.02
Number of kids in household	.89		.84				.85	1.01	.98	1.06	1.15	1.01
Male	1.25						1.19					
age14-19	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Reference category					
age20-29	1.57	1.74	1.38				.96					
age30-39						.64	.57					
age40-49							.54					
age50-59	.78		.67		.75		.42					
age60-69			.65				.46					
age70-	1.48						.75					
Married		.72	.77				.99	.78	.86	.87	1.01	.96
Education high							.95	.94	.88	.91	.94	1.03
Full time employed							1.09	1.06	1.15	1.15	.98	1.11
Part time employed		.74			.71		1.1	.82	1.08	1.06	.71	.9
Unemployed							1.61	1	.69	1.27	1.23	.76
Swiss Citizen	.65						.61	1.15	1.27	1.36	1.23	1.66
Language Swiss German				1.58			1.23	1.14	.84	1.41	1.08	.73
Lake Geneva	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Reference category					
Middleland							.97					Only base effect
North-West CH							.95					Only base effect
Zurich							.90					Only base effect
East-CH		1.40					1.05					Only base effect
Central CH							.87					Only base effect
Ticino							.95					Only base effect
Lives in Urban Centre							.98	1.29	.98	.99	.98	.82
Household moved within last 12 months	.39	.38	.26	.21	.20	.18	.33	1.45	.77	.83	.71	.66
Household has intention to move within next 12 months	.	1.28	.	1.39	1.26	1.32	.	.	.	.	.	.
SOCIAL ISOLATION												
House bad							.98	1.03	1.06	1.06	.96	1.07
House owner							.83	1.25	1.11	1.07	.95	1.1
Satisfaction with various aspects	.80	.82	.79				.75	1.06	1.06	1.12	1.44	1.23
HEALTH												
Health Problems							1.31	.71	.95	.95	.77	.92
Health improved during last 12 months							.99	1.01	1.01	1.04	1.05	.99
Do_sports				.74			1.07	.99	.99	.74	.8	.98
TOPIC INTEREST AND MOTIVATION												
Engaged in voluntary work			.77		.78		.86	1.01	.88	.89	.88	1.06
(Potential) Political Participation	.85	.84				.82	.84	1.04	1.19	1.14	1.12	.96
Political Left orientation							.89	1.05	1.16	1.04	1.16	1.06
Political interest	.77		.82	.79	.75	.74	.82	1.07	1.01	1.04	.9	.9
Subjective questions noanswer							.97	1.15	1.21	1.21	1.08	1.33
Number of extreme categories		1.05	1.05	1.03			1.03	1.01	1.03	1.01	.96	1
Number of middle categories				1.07			1.01	1.01	.98	1.05	1.03	.97
Income noanswer	1.35						1.42	.84	.79	.79	.83	.8
Response rate within household	.14	.14	.23	.22	.30	.20	.14	.84	1.2	1.55	1.68	1.16
SURVEY STATUS OF INDIVIDUAL												
Person is Reference Person (only more-adult-HH)	.56	.66		.63	.77	.72	.6	1.17	1.52	1.22	1.32	1.26
N	7769	6333	5719	4874	4332	3592	N=32619, p=.20 (Intra-cluster coeff.)					
MCFadden Pseudo R ²	.068	.064	.057	.053	.045	.055	-					
LR chi ²	506	331	309	212	209	176	Wald chi ² (Deg. Freedom=180)					1485

odds ratios. "-" = n.a. Single wave models: only significant (1%) effects from forward regression model included.

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