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Essays on Social Comparison

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Table of Contents

Essays on Social Comparison

Abstract

Paper 1: By using hypothetical choice experiments, this paper presents evidence that individuals' concern for relative consumption depends on their relative consumption. Individuals with consumption levels above society's average consumption level tend to have, in general, lower concern for relative consumption. This supports Duesenberry's (Duesenberry, 1949) notion that people are more concerned with upward social comparison than with downward social comparison.

Paper 2: This paper presents a closed form consumption function for an individual when his utility depends both on his own current and previous consumption and on the consumption by his relevant others. Given this model, I argue that we can introduce an alternative definition of marginal propensity to consume (MPC) in addition to the traditional definition. This alternative definition can be called the individual's total MPC, which I show is smaller than the traditional MPC.

Paper 3: Based on Swedish survey evidence, professors are happier than lecturers; but employed academics with better self-reported publication lists are not happier than their colleagues. Both absolute wage and relative wage seem to affect happiness. Employed academics who earn more than faculty colleagues with the same academic position and gender are also happier. For those who just started their academic careers, the results show that students with relatively better exam results are not happier than their classmates. Moreover, it seems optimal for students' happiness to study 30-40 hours per week.

Employed academics with average or worse self-reported publication lists are more likely to think they will be happier in the future than colleagues with better self-reported publication lists. This finding is similar for students: Students with worse exam results are more likely to think they will be happier in the future than their classmates with better or average exam results. Hence, while relative academic performance does not seem to affect current happiness, it does seem to be negatively correlated with expected future happiness.

Paper 4: Campbell and Mankiw's(1990) lambda model has frequently been used to estimate the fraction of rule of thumb consumers (i.e., consumers who do not smooth their consumption). However, the present note shows theoretically, as well as with a numerical illustration, that existing empirical applications of the lambda model imply a systematic under estimation of this fraction. The reason is that per capita values instead of aggregate values (which the model is designed for) are used.

Paper 5: Being sick listed is not always identical to being ill; it is rather a behaviour associated with illness. In this paper we have analysed whether there is a higher risk of becoming sick listed if a family member has been sick listed earlier – partly a family phenomenon. This aspect of sick listing has never been investigated before. Our results indicate that an individual's risk of being sick listed in 2007 was higher if he/she had family members who had been sick listed in 2006. This may be a sign for an existing "sick listing culture" – social norms within families.

Keywords: Marginal degree of positionality; relative consumption; marginal propensity to consume; self-reported current happiness; self-reported expected future happiness; relative academic performance; comparison wage; permanent income consumers; current income consumers; rule of thumb consumers; aggregation bias; sick listing; social norms

JEL classification: A22; C91; D11; D12; D60; D91; E21; I31; J22

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Preface

I started this journey for quite some time ago and with these words I also end this journey. It is with mixed feelings I write this preface. First and foremost, I am very happy to have Olof Johansson-Stenman and Katarina Nordblom as supervisors. Olof is a humble professor and in addition very brilliant. I believe that without your help and guidance throughout the dissertation process this thesis would never have been completed. I thank you Olof from the bottom of my heart. I would also like to thank Katarina for your help and valuable comments. Finally, I would like to thank other colleagues at the department of economics and especially *La Familia* for inspiring conversations.

After my licentiate degree I started to work at Statistics Sweden. One of co-workers was Jan Andersson; he has a wide knowledge and curiosity for labor market issues. He opened my eyes for labor market topics and this brought back my interest for research. Later on, when I changed to the unit of economic analysis I had the benefit to cooperate with Claes-Håkan Gustafson. He has always supported me in my work and in addition to finish my PhD thesis. Thank you Jan and Claes-Håkan!

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Paper 1

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Is concern for relative consumption a function of relative consumption?☆

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Abstract

By using hypothetical choice experiments, this paper presents evidence that individuals' concern for relative consumption depends on their relative consumption. Individuals with consumption levels above society's average consumption level tend to have, in general, lower concern for relative consumption. This supports Duesenberry's [Duesenberry, J.S., 1949. Income, Saving, and the Theory of Consumer Behavior. Havard Univeristy Press, Cambridge, MA] notion that people are more concerned with upward social comparison than with downward social comparison.

JEL classification: C91

Keywords: Relative consumption; Marginal degree of positionality; Choice experiments; Questionnaire-experimental methods

1. Introduction

Empirical evidence suggests that many individuals would accept a reduced *absolute* level of income, if they could have a better *relative* income in society; see e.g. Solnick and Hemenway (1998, 2005), Johansson-Stenman et al. (2002), Carlsson et al. (2003, 2005), and Alpizar et al. (2005). Earlier studies have largely focused on the extent to which utility depends on both absolute and relative income.

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Duesenberry (1949) emphasizes how an individual's consumption decision is affected by the consumption of others, but his notion about relative consumption was for a long time overlooked. Lately, economists have accepted Duesenberry's idea, e.g. Frank (1985, p. 150) argues that "...concerns about relative standing are perfectly compatible with the economist's view that people pursue their own interest in a rational way". A scholar that advocates Duesenberry's notion today is Schor (1998, p. 4). She argues that individuals today make "comparison with, or choose a 'reference group', people whose income are three, four, or five times their own". One thing that Duesenberry (1949, p. 101) claims is that "Low-income groups are affected by consumption of high-income groups but not vice versa", i.e. individuals care about relative consumption when they do an upward social comparison. This notion of social upward comparison, i.e. individuals look at a richer reference group, is also confirmed empirically by Bowles and Park (2005). They find that work hours increases by the degree of income inequality. Usually in the economic literature, and in this study, individuals' reference level is assumed to be exogenously given. However, Stutzer (2004) finds empirically that individuals who live in communities with higher incomes have higher aspiration levels, ceteris paribus. This may indicate that the environment of individuals affects their reference levels. Furthermore, Falk and Knell (2004) show empirical evidence suggesting that reference levels of students increase with their abilities.

This paper tests Duesenberry's notion by conducting hypothetical choice experiments for people in academia using a survey. An already established choice experiment procedure, see Johansson-Stenman et al. (2002) and Alpizar et al. (2005), is used when respondent concern for relative consumption is measured. I run three choice experiments: one benchmark experiment and two additional choice experiments, analogous to the benchmark experiment but using different hypothetical relative consumption amounts. I find that the concern for relative consumption is a function of the respondents' relative consumption. Respondents who, hypothetically, are in a situation where they consume less than the society average are more concerned about their relative consumption compared to respondents who consume more than the society average.

This study is parallel to Ferrer-i Carbonell's (2005) test for an asymmetric social comparison effect, where she tests how people's relative income affects their stated subjective happiness.[1] She finds that people's happiness is negatively affected if their income is below their reference levels, but people's happiness is not affected if their income is above their reference levels. However, according to Ferrer-i Carbonell and Frijters (2003), self-reported well-being is not a physical phenomenon that can be easily and objectively measured. Moreover, self-reported well-being is considered to be problematic, e.g. potential income biases in the subjective happiness norm; see e.g. Brekke (1997) and Osmani (1993). Hence, a different test, compared to Ferrer-i Carbonell (2005), regarding the asymmetric social comparison effect in the context of concern for relative consumption provides additional insights into the area of relative income/ consumption.

Section 2 introduces the hypotheses for the concern for relative consumption, Section 3 explains the choice experiment, Section 4 presents the result, and in Section 5, I draw some conclusions.

[1] There is a vast number of studies on how relative income affects happiness, but to my knowledge only Ferrer-i Carbonell (2005) discusses the asymmetric social comparison effect. For excellent surveys regarding happiness, economics, and relative income see, e.g. Frey and Stutzer (2002) and Van Praag and Ferrer-i Carbonell (2004).

2. Hypothesis

Suppose an individual's utility depends both on his relative consumption, r_i, and on his absolute consumption, c_i, as follows[2]:

$$u_i = v(c_i, r_i) = c_i^{1-\gamma} r_i^{\gamma} \equiv c_i^{1-\gamma} \left(\frac{c_i}{\bar{c}}\right)^{\gamma}, \tag{1}$$

where c_i is individual i's level of consumption, $\bar{c}$ his reference group's level of consumption, and γ is the marginal degree of positionality (MDP). The definition of marginal degree of positionality (γ) is the same as in Alpizar et al. (2005), and is

$$\gamma = \frac{(\partial v/\partial r_i)(\partial r_i/\partial c_i)}{\partial v/\partial c_i + (\partial v/\partial r_i)(\partial r_i/\partial c_i)}, \tag{2}$$

which follows from (1). The marginal degree of positionality (γ) is the fraction of total utility change that comes from the increased relative consumption from the last krona spent.[3] For instance, $\gamma = 0.2$ implies that from an additional krona, 20% of the utility increase comes from the increased *relative* consumption. It is easy to see that when $\gamma = 0$, the utility function collapses to an ordinary utility function, where merely individual i's absolute consumption matters. If $\gamma = 1$, utility depends merely on individual i's relative consumption. It is possible also that the MDP may be negative, or exceeds one.

According to e.g. Duesenberry (1949), low-income individuals compare themselves with high-income individuals but not vice versa. Hence, we have an upward social comparison in the economy. In the hypothetical choice experiment all respondents are given the same reference level: the society average consumption level. Then it is possible to test if relative consumption has an impact on the marginal degree of positionality. Hence, I formulate the following hypotheses:

H0. γ independent of r_i.

H1. γ decreases with r_i.

The alternative hypothesis implies that the concern for relative consumption is higher for a respondent who consumes less than the society average compared to a respondent who consumes more than the society average, consistent with Duesenberry.

3. The choice experiment

The respondents' marginal degree of positionality are elicited with choice experiments that follow the design of an already established choice experiment procedure; see Johansson-Stenman et al. (2002) and Alpizar et al. (2005).[4] The eliciting technique allows each respondent to choose a fictitious grandchild. This technique is used in order to disentangle the respondents' actual consumption from the hypothetical consumption choices that they entertain in the survey.

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[2] The concern for relative consumption can of course be measured with other utility functions than a ratio comparison, for example with an additive comparison utility function; see e.g. Knell (1999) and Alessie and Lusardi (1997). In Section 4, a sensitivity analysis is performed with respect to the choice of utility function.

[3] The Swedish currency. SEK 7.90 ≈ $ 1 on 10 March 2006.

[4] This study uses consumption instead of income as in Johansson-Stenman et al. and Alpizar et al.

The respondents read the following information before conducting the positional experiment:

Now we ask you to choose between two different future situations for a fictitious grandchild. We want you to choose the situation that you would consider the fictitious grandchild to enjoy the most and be most content in. The two situations will be described with the average monthly consumption in society in addition to your grandchild's monthly consumption which varies between the situations. The grandchild will live in a residential area that hosts a cross-section of the population.

The two situations are the same in all aspects except the levels of consumption, i.e. the grandchild's monthly consumption and the average monthly consumption vary. The price level of goods is the same in both the situations, as are the items to purchase. That is, for e.g. 100 SEK your grandchild can purchase exactly the same in both situations. In both situations a centrally located apartment with four rooms with a kitchen costs around 10,000 SEK, while three rooms with a kitchen in some suburban areas costs 5000 SEK. The degree of inequality in society is the same in both situations. The environmental load of pollution is identical, i.e. lower consumption is not better for the environment.

Note that there is no "right" answer, but we ask you to make as thoughtful answers as possible. You may go back and correct your answers if you change your mind.

After this introductory text the respondents read a sample question; see Appendix A for this question.

Three different hypothetical choice experiments were conducted. One was the *benchmark* experiment, with the same values as Johansson-Stenman et al. (2002). The other two experiments were analogous to the benchmark experiment. Either the respondents entertain a consumption level that is always below the society average (*under* experiment) or they entertain a consumption level that is always above the society average (*over* experiment). See Table 1 for the different consumption amounts in the three choice experiments. After reading the introduction text, the respondents were assumed to be able to conduct the experiments. The first pair-wise question in the benchmark experiment was:

Compare situation A with B

Situation A: Your grandchild's monthly consumption is 25,000 SEK/month. The average monthly consumption in society is 30,000 SEK/month.

Situation B: Your grandchild's monthly consumption is 25,000 SEK/month. The average monthly consumption in society is 20,000 SEK/month.

Given the described conditions, which of situations A and B do you regard to be the best for your grandchild, i.e. the situation your grandchild would enjoy the most and be the most content in.

Note that the price level is the same in situations A and B, e.g. for 100 SEK your grandchild can buy exactly the same in both situations. In addition, the load of environmental pollution and the degree of inequality are exactly the same in both situations.

☐ Situation A: go to experiment 2, p. 8.
☐ Situation B: go to question 1:2.
☐ Situations A and B are equally good: go to experiment 2, p. 8.

Adjacent to each answer, the respondents could read how to proceed. The different answers for pair-wise question no. 1 (in all three experiments) contained three possible answers: situation A, situation B_1, or indifferent between situations A and B_1. If the respondent preferred situation A or was indifferent between situations A and B_1, the experiment ended. But, if the respondent preferred situation B_1, the respondent continued to the subsequent pair-wise question no. 2. The possible answer set then consisted of situation A or B_2. If the respondent preferred situation B_2, the experiment continued until he or she chose situation A in a subsequent pair-wise question, or until there were no more questions. There were in total seven

Table 1
The three different experiments with their different values of the fictitious grandchild's consumption (c_i) and the average level of consumption for society ($\bar{c}$)

Name of experiment	Pair-wise[a] question	Grandchild's consumption (c_i)	Average consumption ($\bar{c}$)	γ if indifferent between A and B_j [Ratio (additive[b])]
Benchmark	A	25,000	30,000	–
	B_1	25,000	20,000	0.00 (0.00)
	B_2	24,000	20,000	0.10 (0.10)
	B_3	23,000	20,000	0.20 (0.20)
	B_4	20,400	20,000	0.50 (0.46)
	B_5	18,400	20,000	0.75 (0.66)
	B_6	17,400	20,000	0.90 (0.76)
	B_7	16,650	20,000	1.00 (0.84)
Over: consumption levels in A imply that $c_i > \bar{c}$	A	31,000	30,000	–
	B_1	31,000	20,000	0.00 (0.000)
	B_2	29,750	20,000	0.10 (0.125)
	B_3	28,550	20,000	0.20 (0.245)
	B_4	25,300	20,000	0.50 (0.570)
	B_5	22,850	20,000	0.75 (0.815)
	B_6	21,500	20,000	0.90 (0.950)
	B_7	20,600	20,000	1.00 (1.040)
Under: consumption levels in A imply that $c_i < \bar{c}$	A	28,200	39,000	–
	B_1	28,200	30,000	0.00 (0.000)
	B_2	27,450	30,000	0.10 (0.083)
	B_3	26,800	30,000	0.20 (0.156)
	B_4	24,700	30,000	0.50 (0.389)
	B_5	23,200	30,000	0.75 (0.556)
	B6	22,300	30,000	0.90 (0.656)
	B_7	21,700	30,000	1.00 (0.722)

[a] The subscript numbers of B represent the pair-wise question number. The pair-wise questions are presented in a consecutive order for each respondent.
[b] The additive comparison function is $u_i = v(c_i, \bar{c}) = c_i - \delta\bar{c}$.

pair-wise questions.[5] All three choice experiments (benchmark, over and under) follow this procedure.

In Table 1 we can see the different pair-wise choice questions and their corresponding consumption amounts for all three experiments. In order to illustrate how the MDP value is calculated, we look at pair-wise question no. 3 in the benchmark experiment, i.e. situation A versus situation B_3 in Table 1. MDP values of the other pair-wise questions are calculated analogously. From the information in Table 1, we know that society's average consumption is 30,000 SEK in situation A, while the grandchild's consumption is 25,000 SEK; meanwhile in situation B_3 society's average consumption is 20,000 SEK and the grandchild's consumption is 23,000 SEK. If, for example, the respondent i is indifferent between two situations (A and $B_{j=3}$), his marginal degree of positionality can be solved from the knowledge that $c_{iA}/\bar{c}_A^{\gamma} = c_{ijB}/\bar{c}_B^{\gamma}$, which comes from Eq. (1) and

[5] This procedure was chosen in order to reduce the time effort each respondent had to put in. Nonetheless, it has pros and cons: it minimizes the time effort, but it also gives the respondents the opportunity to end the experiments if they choose the alternative that allows them to end, which hence gives downward biased parameter values. Furthermore, the procedure takes away most of the non-monotonic answers.

where γ is the only unknown. For the other two experiments, i.e. under and over, the marginal degrees of positionality can be calculated analogously for pair-wise question no. 3, although the consumption amounts are different. To illustrate how the marginal degree of positionality is calculated for pair-wise question no. 3 ($j = 3$) in all three experiments, I show below the calculation procedure:

$$\gamma = \frac{\ln(c_{ij\mathrm{B}}/c_{i\mathrm{A}})}{\ln(\bar{c}_\mathrm{B}/\bar{c}_\mathrm{A})} \approx \underbrace{\frac{\ln(23,000/25,000)}{\ln(20,000/30,000)}}_{\text{benchmark}} \approx \underbrace{\frac{\ln(28,550/31,000)}{\ln(20,000/30,000)}}_{\text{under}}$$
$$\approx \underbrace{\frac{\ln(26,800/28,200)}{\ln(30,000/39,000)}}_{\text{over}} \approx 0.2. \tag{3}$$

In these illustrating examples the marginal degree of positionality is approximately 0.2, which implies that from an additional krona, 20% of the utility change comes from the increased relative consumption.

3.1. The questionnaire

The questionnaire consists of four sections: (i) background questions; (ii) experiment 1: regarding respondent habit-formation behavior; (iii) experiment 2: regarding respondent concern for relative consumption; (iv) questions about respondent characteristics. There was no monetary compensation or any other perks given to the respondents. The habit-formation experiment is beyond the scope of this paper and is presented in a separate paper.

The survey focused on two categories of people in the academic environment: those employed (professors and lecturers) by Göteborg University, and students at Göteborg University and Chalmers University of Technology. These two groups were chosen partly because they are at different stages in their life-cycles, and partly because they are easy to get in touch with. Another reason is that they are trained to read and understand abstract questions. In mid-January 2005 the employees received the questionnaire through the university internal mail system, and those who did not answer received a second identical questionnaire in mid-February 2005 as a reminder. During the same time period, students in business, social work, and mechanical engineering were targeted and approached at the end of a lecture, and were asked if they wished to – voluntarily – participate in a survey. Conducting the experiments took, on average, around 20 min.

At first, 1007 questionnaires were sent to all professors and lecturers registered in the end of 2004. However, it turned out that only 994 names were valid, since people had resigned, were on leave of absence, abroad, or had passed away. From these 994 questionnaires, 286 were returned and completed. An additional 44 questionnaires were returned as well, but these did not contain any useful information. This gives a response rate of 28.8% (27.7% and 30.8% for lecturers and professors, respectively). In total 605 students took part in the experiment, representing five different lecture groups: two groups of social work students where the participating rate was, on average, 85%; two groups of business students where the participating rate was, on average, 85%; one group of engineering students where the participating rate was 99%. The total sample therefore consists of 891 respondents.

The students and the employees were randomly divided into two groups where: one group answered the benchmark experiment and the other answered both the over and under experiments. Although the respondents are to various degrees trained in handling abstract problems, the experiments are complex and difficult to understand, which may suggest that an order effect exists. To test for this there were in total four versions of the questionnaire, where the two types of experiments (habit and positionality) have different orders.[6]

For the relative consumption experiments, out of 1254 choice experiment answers, 29 (2.3%) were inconsistent, e.g. they answered the first and third pair-wise questions, but not the second.[7]

4. The result

From the results of the choice experiments (see Table 2) it is possible to observe that the results from this survey are in line with Dueseneberry's claim: $\gamma_{\text{under}} = 0.544 > \gamma_{\text{bench}} = 0.325 > \gamma_{\text{over}} = 0.181$.[8] The results immediately suggest that the concern for relative consumption is higher for a respondent who consumes less than the society average, compared to a respondent who consumes more than the society average, i.e. supporting the alternative hypothesis. The results from these three choice experiments also indicate that there to some degree exists a concern for relative consumption, which has earlier been recognized by e.g. Solnick and Hemenway (1998), Johansson-Stenman et al. (2002), Carlsson et al. (2003, 2005), and Alpizar et al. (2005).

This study has a lower mean MDP than in the experiment of Johansson-Stenman et al. (0.43). In the case of only students, the mean MDP is even lower; see Table 2.[9] Their median degree of positionality is between 0.2 and 0.5, while the median MDP in the benchmark experiment is between 0.0 and 0.1. One simple explanation may be that people in general are more positional regarding their income compared to their consumption level, since these choice experiments use relative consumption while Johansson-Stenman et al. (2002) use relative income.

[6] The order of the experiments were: (I) over & under and habit, (II) habit and over & under, (III) benchmark and habit, and (IV) habit and benchmark. The questionnaires were distributed among the students and the employees using the following procedure: for the students, I interrupted lectures in the lecture halls and distributed the questionnaires row by row. I had mixed the different versions so that every fourth student received the same version. Therefore, a student who answered a certain version had different versions of the questionnaires on each side. This procedure minimizes the "peeking" effect that may otherwise be present. For the employees I assigned a uniformly distributed continuous number between 0 and 1 to each one in the data set. If these numbers were within a certain predetermined interval the respondents received a predetermined version of the questionnaire that corresponded to the interval.

[7] The inconsistent (non-monotonic) answers may be explained by that the respondents read the instructions by themselves—I did not explain the experiment procedure to them. There were 11 inconsistent answers for the benchmark experiment, and 7 and 11 for the over experiment and under experiment, respectively.

[8] The calculation of the mean value is made after first assessing values to the two extreme cases $\gamma < 0$ and >1. I give these extreme cases the numerical values -0.05 and 1.05, respectively, which are the same values Johansson-Stenman et al. (2002) use. On the other hand, we do not know the distribution of γ and if γ is normally distributed it implies other extreme values of γ (than -0.05 and 1.05) which leads to that the mean γ_{over} cannot be positive; but the same order still holds between three experiments. The distribution of γ is an area for future research. The other numerical values are given the values that correspond to the marginal degree of positionality that is in the mid of each interval. The mean values are then calculated as: all respondent MDP values are summed up and divided by the number of respondents. The same procedure is also used for the other two mean MDP values.

[9] There may be a problem with sample selection between the two groups, since those who do not wish to undertake the experiments may have similar characteristics, i.e. MDP values. For example, if the share of non-respondents is higher for the employed group (it is easier for them to skip the experiments) with a certain characteristic, its standard deviation of MPD would differ compared to the student group. Hence, I test if the variance is equal between the two groups by running a Levene's test. Thereby I can conclude that the variance is equal between the two respondent groups in the under and benchmark experiment, but not in the over experiment.

Table 2
The results from the three different choice experiments

Parameter values positionality	Under $n=389$ Freq.	Benchmark $n=438$ Freq.	Over $n=398$ Freq.
$\gamma<0$	0.129	0.327	0.588
$\gamma=0$	0.062	0.114	0.088
$0<\gamma<0.1$	0.069	0.062	0.045
$0.1<\gamma<0.2$	0.043	0.034	0.010
$0.2<\gamma<0.5$	0.147	0.116	0.038
$0.5<\gamma<0.75$	0.172	0.126	0.085
$0.75<\gamma<0.9$	0.064	0.048	0.023
$0.9<\gamma<1.0$	0.044	0.082	0.083
$\gamma>1$	0.270	0.091	0.040
$\bar{\gamma}$	0.544	0.325	0.181
std$\bar{\gamma}$	0.419	0.409	0.377
$\bar{\gamma}_{\text{employed}}$	0.517 ($n=123$)	0.353 ($n=134$)	0.115 ($n=130$)
std$\bar{\gamma}_{\text{employed}}$	0.407	0.417	0.325
$\bar{\gamma}_{\text{students}}$	0.552 ($n=266$)	0.312 ($n=304$)	0.212 ($n=268$)
std$\bar{\gamma}_{\text{students}}$	0.425	0.406	0.396
Levene's test[a] significance value	0.274	0.580	0.000

Note: n is the number of respondents who answered in the different experiments.
[a] Tests if the variance is equal between employed and student groups. A value higher than 0.10 suggests that the variances are equal.

Moreover, Johansson-Stenman et al. (2002) perform a crude test of which comparison function (ratio or additive) works best from the assumption that respondents' marginal degree of positionality are the same regardless of respondent relative income. In addition to their original experiment, they construct two other experiments where the grandchild's income is either always much lower or always much higher than the average income in society.[10] These two experiment are analogous to the under and over experiments. Johansson-Stenman et al. (2002) find that the mean marginal degree of positionality are lower for both the under experiment (0.37), where the grandchild's consumption is always below the average, and the over experiment (0.31), where the grandchild's consumption is always above the average. Hence, their MDP structure is $\gamma_{\text{lower}}=0.37<\gamma_{\text{medium}}=0.43>\gamma_{\text{higher}}=0.31$, which is inconsistent with the mean MDP structure I find. My notion is that this difference depends on their use of other values in their choice experiments. For example, people on the brink of poverty do not have the luxury to accept a reduced level of income in order to have a better relative income. Earlier analogous studies such as Carlsson et al. (2003, 2005) and Alpizar et al. (2005) find mean values of MDP to be in the interval of 0.28–0.79.[11]

The result here is also consistent with recent happiness studies such as Ferrer-i Carbonell (2005). In a German data set she finds that individuals with income levels above their individual specific reference levels are not happier, but individuals with income levels below their refer-

[10] For the under experiment, this study's relative consumption ratios – grandchild versus society's average – in situations A and B_1 are 72.3% and 94%, respectively, while in Johansson-Stenman et al. (2002) the corresponding relative income ratios are 50% and 75%, respectively. For the over experiment, this study's relative consumption ratios in situations A and B_1 are 103% and 155%, respectively, while in Johansson-Stenman et al. (2002) the corresponding relative income ratios are 200% and 300%, respectively.
[11] When they calculate their mean MDP they use the same extreme values as in this study.

Table 3
Interval regression estimates of the marginal degree of positionality parameters

Variables	Coefficient			
	Ratio (γ)[a]		Additive (δ)[a]	
	All[b]	Employee[b]	All	Employee
Constant	0.325*** (0.027)	0.511*** (0.104)	0.278*** (0.024)	0.419*** (0.090)
Order effect	−0.033 (0.022)	−0.017 (0.335)	−0.024 (0.020)	−0.017 (0.033)
Under experiment	0.208*** (0.027)	0.152*** (0.047)	0.110*** (0.024)	0.068* (0.041)
Over experiment	−0.137*** (0.027)	−0.234*** (0.046)	−0.079*** (0.024)	−0.172*** (0.040)
Student	0.030 (0.024)		0.030 (0.021)	
Wage/1 × 10^6		−3.911 (2.633)		−2.746 (2.281)
Observations	1225	382	1225	382

Note: standard errors in parentheses. *Significant at 10%; **significant at 5%; ***significant at 1%.
[a] Utility function.
[b] Group.

ence levels are less happy. Unlike Ferrer-i Carbonell (2005), where actual levels of income are used, the design of these experiments allows the individuals to have both a hypothetical low and high *relative* consumption, which strengthens the empirical evidence of existing asymmetric social comparison effects. Although these studies indicate the existence of an asymmetric social comparison effect, more research with different methodology is beneficial, particularly eliciting information of individuals' marginal utility when they make an upward social comparison.

In order to test if I can reject the Duesenberry's hypothesis I run a simple interval regression, where the MDP is the dependent variable and the under and over experiments are dummy variables. Furthermore, I include two dummy variables: if the respondents are students and if they took the positional experiment before the habit experiment (a significant dummy will then suggest that there is an order effect). The results in Table 3 (column two) show that the marginal degree of positionality is significantly higher in situations where the respondents make an upward social comparison. Therefore, I can reject the null hypothesis: MDP does decrease with relative consumption. Thus, this survey supports Duesenberry's (1949) claim that people generally care more about relative consumption when they make an upward social comparison. In addition, we can see that there is no significant difference between students and employed respondents.[12]

A notable feature in the under experiment (see Table 2) is that 27% of respondents have $\gamma_{\text{under}} > 1$.[13] If the respondents' true utility function is instead an additive comparison function equal to $u_i = v(c_i, \bar{c}) = c_i - \delta\bar{c}$ it changes the MDP values. MDP, (δ), is now calculated as

$$\delta = \frac{c_{i\text{A}} - c_{i\text{B}}}{\bar{c}_{\text{A}} - \bar{c}_{\text{B}}}. \tag{4}$$

One implication of changing the comparison functional form is that higher MDP values from the under and the benchmark experiments decline. For example, the MDP values of $\gamma_{\text{under}} > 1$ in

[12] Moreover, I have also run regressions with objective variables such as: age, gender, and number of siblings, but none of these turns out to be significantly different from zero. This may implies that respondents' different stages in the life-cycle do not influence their MDP. The results are available from the author upon request.

[13] Over 18% of the respondents that have $\gamma \leq 0$ and >1 in the over and in the under experiment, respectively. Their preferences are completely reversed in these two experiments.

the under experiment decline to $\delta_{under} > 0.72$ (see Table 1). On the other hand, the opposite is true for the over experiment (now $\delta_{over} > 1.04$ instead of $\gamma_{over} > 1.00$).

This implies that with an additive comparison function (4) the mean MDP values change to: $\delta_{under} = 0.441 > \delta_{bench} = 0.319 > \delta_{over} = 0.221$. The structure of mean MDP values is consistent given different comparison utility functions.[14] Using the additive MDP values I run a new interval regression to see if the dummy variables (for the experiments) are significant. The result in Table 3 (column four) shows evidence suggesting that the MDP values are significantly higher in situations where the respondents make an upward social comparison. Hence, the hypothesis that MDP decreases with relative consumption cannot be rejected for any of the types of utility functions.

Next step in the analysis is to test if the MDP structure is robust for respondents' wages, i.e. to control for the attitudes of respondents at different levels of society. I have register data on professors and lecturers monthly wages, but I have no data on students' level of income neither their level of consumption. Thus, two new interval regressions are estimated, but only with the employed people (columns three and five).

We can see, in Table 3, that the dummies for the two different experiments (over and under experiment) are still significantly different from zero and that the wage coefficients are not significantly different from zero. However, the p-values for the wage variables are 13.8% and 22.9% for the ratio and additive utility functions, respectively. This is rather low, I therefore argue that the individuals' position in society cannot fully be neglected, since it indicates that "richer" respondents care to some degree more about their absolute level of consumption than "not that rich" respondents. Hence, the results supports the alternative hypothesis, i.e. it seems that the concern for relative consumption is in fact a function of relative consumption.

4.1. Possible biases

A notable feature in Table 2 is the fraction of respondents having a negative marginal degree of positionality, $\gamma < 0$, in the experiments.[15] The evidence suggests that there is a tendency that the fraction of the respondents with $\gamma < 0$ is negatively related with the relative consumption in the experiments. For example, in the over experiment, a little more than 58% of the respondents have $\gamma_{over} < 0$.[16] Meanwhile in the under experiment, the corresponding fraction is a little more than 12%.

Why do we see this distinct difference in the fraction of respondents having negative MDP in the different choice experiments? Suppose now that a respondent's preferences are $\gamma < 0$ and >0 for the over and the under experiments, respectively. The respondent's cognitive evaluation process

[14] I have also tested changing the extreme MDP values for both utility functions, i.e. for the ratio comparison utility function; instead of $\gamma = -0.05$ and 1.05, the MDPs now have the values $\gamma = -0.50$ and 1.50, respectively. This alteration of the extreme MDP values will of course change the mean MDP values, but the same structure between the mean MDP values is still present. Also, there is still a significant difference between the experiments even under the two types of comparison utility functions.

[15] If $\gamma < 0$, it may imply a kind of altruism. Then, if the respondents have a higher consumption level than the society average, it is more likely that the respondents have altruistic feelings compared to when the respondents have a consumption level that is lower than the society average.

[16] In pilot studies, equally high fractions of respondents have revealed that their preferences were less or equal to zero. I have even reversed the order of the experiments so that the respondents would answer the last question first (in this setup), but this gave approximately the same high marginal degree of positionality.

for the pair-wise questions begins with the comparison of situation A′s consumption possibilities, followed by situation $B'_{j=1}s$ consumption possibilities, where $j \in \{1, 7\}$ and indicates the pair-wise choice question. For example, when the respondent studies pair-wise question no. 1 in the over experiment, he sees that in situation A the grandchild consumes more than average. Meanwhile in situation B_1, the grandchild has a substantially higher relative consumption compared to situation A. Then, if the respondent has an aversion against a situation where the grandchild would belong to a group in society with a high relative consumption (brat aversion) or if the respondent has some kind of altruistic preferences, he chooses A over B_1. The larger the consumption gap in situation B_1, i.e. $c_{j=B_1} > \bar{c}_B$, the more likely it is that the respondent chooses situation A. Another explanation may be what Johansson-Stenman et al. (2002) suggest. Respondents choose not to care so much about relative consumption, because they think such preferences are not good for future family members to have. This notion may influence respondents to choose $\gamma < 0$ in the over experiment. Moreover, one explanation that cannot be neglected is that the respondents choose the non-positional situation in order to end the experiments as fast as possible; which would give a downward biased MDP value.

In the under experiment the grandchild's consumption level is always below average ($c_i < \bar{c}$). If the respondent has an aversion against his grandchild belonging to a group of individuals that consume less than average, the respondent chooses situation B_1 over situation A. This is obvious, since in situation B_1 the grandchild's consumption is closer to the society average compared to situation A. Thus, the respondent then cares to some degree about his grandchild's relative consumption.

Furthermore, in total only 14 individuals chose such parameter values that enabled them to end the experiments as soon as possible. Such a low fraction (3.2%) of respondents ought to rule out the explanation that the low mean MDP is due to the respondents having ended the experiments without revealing their true preferences. Another explanation may be that depending on in which order the respondents performed the relative experiments, the proportion of respondents that chose $\gamma \leq 0$ may differ. On the other hand, we can see in Table 3 that the dummy for the order effect in the interval regression is not significant. Therefore, it seems that the order affect did not effect the proportion of respondents that chose $\gamma \leq 0$.

5. Conclusion

Previous studies of the concern for relative income have found that individuals often accept a reduced *absolute* level of income if they can have a better *relative* income in society. By using hypothetical choice experiments, this paper tests Duesenberry's (1949) hypothesis that individuals who make an upward social comparison have a higher concern for their relative consumption than those who make a downward social comparison. The empirical results support Duesenberry's hypothesis. Moreover, I find that there are no systematic differences between students and employees and between female and male in their concern for relative consumption. This may suggests that the concern of individuals for relative consumption is independent of where the individuals are in their life-cycles.

Appendix A

Below is a sample question that the respondents read before performing the experiments.

Example: compare situation A with B:

Situation A: Your grandchild's monthly consumption is 25,000 SEK/month. The average monthly consumption in society is 30,000 SEK/month.

Situation B: Your grandchild's monthly consumption is 23,000 SEK/month. The average monthly consumption in society is 20,000 SEK/month.

In this example your grandchild consumes 2000 SEK more per month in situation A compared to situation B.

We also see that your grandchild consumes 5000 SEK/month more than the average in situation A. Meanwhile, in situation B this amount is 3000 SEK/month more than the average.

You shall later on, given the written information, choose which of situation A or B you consider to be the best for your grandchild, i.e. the situation your grandchild would enjoy the most and be the most content in. Situation A will always be the same.

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Paper 2

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Consumption theory with reference dependent utility

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ABSTRACT

This paper presents a closed form consumption function for an individual when his utility depends both on his own current and previous consumption and on the consumption by his relevant others. Given this model, I argue that we can introduce an alternative definition of marginal propensity to consume (MPC) in addition to the *traditional* definition. This alternative definition can be called the individual's *total* MPC, which I show is smaller than the *traditional* MPC.

1. Introduction

Empirical evidence suggests that individuals evaluate own consumption (income) by comparing it to the consumption (income) levels of others; see e.g. Solnick and Hemenway (1998), Johansson-Stenman et al. (2002), Alpizar et al. (2005), and Andersson (2008). This paper presents a general consumption model that is an extended version of Alessie and Lusardi's (1997) consumption model. In Alessie and Lusardi (1997), individuals merely care about their own current and previous consumption. I add the assumption that individuals also compare own consumption with that seen among relevant others, and derive a closed form consumption function for an arbitrary individual. Since an individual's consumption also depends on the consumption by his relevant others, I introduce the individual's *total* marginal propensity to consume (total MPC). Earlier theories like Hall's permanent income hypothesis (PIH) (Hall, 1978), and a pure habit formation behavior model, such as Alessie and Lusardi (1997), imply larger marginal propensities to consume than found in this model.

Is it realistic that individuals only have their own previous consumption levels as reference? Probably not. From a psychological perspective, individuals compare own consumption also with the consumption levels of relevant others. Duesenberry (1949, p. 48) argues that "Any particular consumer will be influenced by consumption of people with whom he has social contacts..."; he coins this concept "the demonstration effect." Duesenberry's notion has long been overlooked in economics models, although he has advocators within psychology. For example, Runciman (1966) argues that individuals have both a space and time dimension of comparison. Frank (1985, p. 146) presents an explanation to why economists are not keen on adopting the space dimension: "To many economists, the notion of consumers being strongly influenced by demonstration effects must have seemed troublingly inconsistent with the reasoned pursuit of self-interest, if not completely irrational." It seems reasonable to extend Alessie and Lusardi's (1997) model by including Duesenberry's demonstration effect. For example Frank (1985, p. 150) supports this by arguing: "... concerns about relative standing are perfectly compatible with the economist's view that people pursue their own interest in a rational way." I believe this extended consumption model adds more knowledge about individuals' actual consumption decision.[1]

This paper has the following structure: Section 2 describes an individual's utility maximization problem. In Section 3, I derive the individual's closed form consumption function in addition to a recursive consumption function. Section 4 discusses the definition of the individual's MPC given different notions of what the individual utility depends on, and finally, Section 5, presents some concluding remarks.

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[1] I use an additive comparison function since Wendner (2002, p. 16) argues that "the multiplicative [i.e., ratio] specification is not in line with elementary properties of habit persistence." Ratio comparisons are used by, e.g. Abel (1990), Carroll et al. (1997), Carroll (2000), and Aronsson and Johansson-Stenman (2008).

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2. The individual's utility

2.1. The individual's utility function arguments

In order to emphasize how important individuals' social interactions with each other are, Aristotle referred to human beings as social animals. By looking at psychological and sociological motives, e.g. Duesenberry (1949), Runciman (1966), Frank (1985), and Elster and Loewenstein (1992) argue that individuals have both a space and a time dimension of comparison. I.e., individuals compare their own current consumption with a reference level that is a function of both the consumption by relevant others and their own previous consumption. Compared to the two consumption models mentioned in Section 1 this adds more realism to what individuals' utility depends on. Put differently, Scitovsky (1992) argues that people wish to keep their status in relation to their reference level, since losing status may be painful. Here I extend Alessie and Lusardi's (1997) model by assuming that people also care about the consumption among relevant others. Then, the "psychological" consumption amount that utility depends on at time τ, for an arbitrary individual, is:

$$c_\tau^* = c_\tau - \gamma c_{\tau-1} - \eta \bar{c}_\tau, \tag{1}$$

where $\eta \in [0, 1]$ controls how much the individual cares about the consumption among his relevant others,[2] $\bar{c}_\tau$.[3] The higher the η, the more the individual cares. The other parameter, $\gamma \in [0, 1]$, controls how much the individual cares about his own previous consumption, and $\gamma > 0$ implies that the individual has a habit-formation behavior. The higher the γ, the more the individual cares about his previous consumption. The formulation in Eq. (1) will then boil down to the one used by Alessie and Lusardi (1997) for $\gamma > 0$ and $\eta = 0$, and when $\gamma = \eta = 0$ it will reflect the conventional model as used by, e.g. Hall (1978).

2.2. The individual's utility maximization problem

By assumption, the individual's utility, $u(c_\tau^*)$, is concave, continuous, and twice differentiable over the interior of the individual's c_τ^*set, and moreover I restrict the individual's consumption amount, c_τ, to always be non-negative.

In order for the individual to optimize his consumption profile, he needs to predict at time τ his stock of *human wealth*, which is the present discounted value of his expected future labor income and the current value of his *non-human wealth* (a). I assume that the individual has a finite life, gives no bequests at period T, dies without any debt, and lives in a world with a perfect capital market (i.e., individuals can borrow and lend at the same constant[4] interest rate) in addition he is not liquidity constrained. Furthermore, I assume that the individual has perfect foresight about his own future labor income and the future consumption among his relevant others; i.e., the information is complete and there is no uncertainty.

Then the individual's intertemporal maximization problem can be specified as

$$\max_{\{c_\tau\}_{\tau=t}^T} U_\tau = \sum_{\tau=t}^{T} \beta^\tau u(c_\tau^*(c_\tau, c_{\tau-1}, \bar{c}_\tau)), \tag{2}$$

subject to his intertemporal budget constraint

$$\sum_{\tau=t}^{T} \left(\frac{1}{1+r}\right)^\tau c_\tau + \left(\frac{1}{1+r}\right)^{T+1} a_{T+1} = a_\tau + \sum_{\tau=t}^{T} \left(\frac{1}{1+r}\right)^\tau y_\tau, \tag{3}$$

and

$$\left(\frac{1}{1+r}\right)^{T+1} a_{T+1} \geq 0, \tag{4}$$

where a_τ and $c_{\tau-1}$ are given. Since the individual cannot have unpaid debts at period T, a_{T+1} cannot be less than zero. Moreover, from the individual intertemporal utility maximization problem, it is not optimal for the individual to have unused resources when he dies, hence $a_{T+1} = 0$ will always hold. Constraints (3) and (4) can therefore be combined into:

$$a_\tau + \sum_{\tau=t}^{T} \left(\frac{1}{1+r}\right)^\tau y_\tau - \sum_{\tau=t}^{T} \left(\frac{1}{1+r}\right)^\tau c_\tau = 0. \tag{5}$$

When the interest rate, r, is constant over time, the intertemporal budget constraint implies that the present discounted value of consumption is equal to the individual's initial wealth (a) plus his present discounted labor income (y).

Furthermore, I assume that the consumption among relevant others is not affected by the individual's consumption; i.e., $\bar{c}_\tau$ is exogenously given.

The individual's discount factor, $\beta = 1/(1+\rho)$, is constant over time, where $\rho > 0$, and is the individual's pure time preference. This rules out any possibility of discontinuity of U_τ (i.e., assures that U_τ does not diverge to infinity).

The individual's intertemporal maximization problem is then solved by maximizing his lifetime utility (2) subject to his intertemporal budget constraint (5). The Lagrangian function for this problem is:

$$\max_{\{c_\tau\}_{\tau=t}^T} \mathcal{L}(c_\tau, c_{\tau+1}, \ldots; \lambda) = \sum_{\tau=t}^{T} \beta^\tau u(c_\tau^*(c_\tau, c_{\tau-1}, \bar{c}_\tau))$$
$$+\lambda \left(a_\tau + \sum_{\tau=t}^{T} \left(\frac{1}{1+r}\right)^\tau y_\tau - \sum_{\tau=t}^{T} \left(\frac{1}{1+r}\right)^\tau c_\tau \right), \tag{6}$$

where λ is the constant Lagrange multiplier. The first order condition for an interior solution at an arbitrary period t is:

$$\frac{\partial \mathcal{L}(\cdot)}{\partial c_t} = \beta^t \frac{\partial u(c_t^*)}{\partial c_t^*} \frac{\partial c_t^*}{\partial c_t} + \beta^{t+1} \frac{\partial u(c_{t+1}^*)}{\partial c_{t+1}^*} \frac{\partial c_{t+1}^*}{\partial c_t} - \lambda \left(\frac{1}{1+r}\right)^t = 0. \tag{7}$$

Since this expression holds for all t, it is obvious that it also holds for $t+1$:

$$\frac{\partial \mathcal{L}(\cdot)}{\partial c_{t+1}} = \beta^{t+1} \frac{\partial u(c_{t+1}^*)}{\partial c_{t+1}^*} \frac{\partial c_{t+1}^*}{\partial c_{t+1}} + \beta^{t+2} \frac{\partial u(c_{t+2}^*)}{\partial c_{t+2}^*} \frac{\partial c_{t+2}^*}{\partial c_{t+1}} - \lambda \left(\frac{1}{1+r}\right)^{t+1}$$
$$= 0. \tag{8}$$

Then solving for the individual's marginal rate of substitution (MRS) by combining (7) and (8), we have (after some manipulation):

$$\frac{(\partial u(c_{t+1}^*)/\partial c_{t+1}^*)(\partial c_{t+1}^*/\partial c_{t+1}) + \beta(\partial u(c_{t+2}^*)/\partial c_{t+2}^*)(\partial c_{t+2}^*/\partial c_{t+1})}{(\partial u(c_t^*)/\partial c_t^*)(\partial c_t^*/\partial c_t) + \beta(\partial u(c_{t+1}^*)/\partial c_{t+1}^*)(\partial c_{t+1}^*/\partial c_t)}$$
$$= \frac{1+\rho}{1+r}. \tag{9}$$

Up to this point, the individual's MRS is valid for both a ratio and an additive comparison function. Let us continue the derivation of the individual's MRS with the additive comparison function as

[2] Relevant others refers to, e.g. neighbors, co-workers, and friends.

[3] This is similar to the psychological consumption that Alonso-Carrera et al. (2004) use in a paper that analyzes the circumstances under which consumption by relevant others is a source of inefficiency. They also included a third reference argument, which is the previous consumption, $\bar{c}_{t-1}$, of relevant others.

[4] The interest rate is independent of the capital stock in the economy.

in (1). Thus, Eq. (1) has the following properties for the additive comparison function:

$$\frac{\partial c_t^*}{\partial c_t} = \frac{\partial c_{t+1}^*}{\partial c_{t+1}} = 1, \tag{10}$$

$$\frac{\partial c_{t+1}^*}{\partial c_t} = \frac{\partial c_{t+2}^*}{\partial c_{t+1}} = -\gamma. \tag{11}$$

Assuming that the individual's pure value of time preference is equal to the interest rate ($\rho = r$), the individual's MRS (9) may be rewritten with the additional properties in (10) and (11) as

$$\frac{(\partial u(c_{t+1}^*)/\partial c_{t+1}^*) - \gamma\beta(\partial u(c_{t+2}^*)/\partial c_{t+2}^*)}{(\partial u(c_t^*)/\partial c_t^*) - \gamma\beta(\partial u(c_{t+1}^*)/\partial c_{t+1}^*)} = 1. \tag{12}$$

Eq. (12) is satisfied if and only if:

$$\frac{\partial u(c_t^*)}{\partial c_t^*} = \frac{\partial u(c_{t+1}^*)}{\partial c_{t+1}^*} = \frac{\partial u(c_{t+2}^*)}{\partial c_{t+2}^*} = \Omega, \quad \forall t, \tag{13}$$

where Ω is a constant (see Appendix A for the proof), i.e., the marginal utility of psychological consumption must be constant over time if the MRS between any two periods equals 1. Any concave utility function implies that when the marginal utility of psychological consumption is constant, the level of psychological consumption is also constant $\Rightarrow c_\tau^* = constant$. (see Lemma 1).

Lemma 1. Eq. (13) *implies that the path of psychological consumption* $\{c_t^*\}_{t=0}^T$ *is constant over time.*

Hence, if the consumption by relevant others increases in period $t+1$, the individual's consumption in period $t+1$ must also increase in order to keep the marginal utility of psychological consumption constant. By utilizing this knowledge, it is possible to derive the individual's consumption change:

$$\Delta c_{t+1} = \gamma\Delta c_t + \eta\Delta\bar{c}_{t+1}, \tag{14}$$

where $\Delta c_{t+1} = c_{t+1} - c_t$. This shows that the individual's consumption change in period $t+1$ depends on his own previous consumption change and the current consumption changes among his relevant others.[5] This is a general Euler equation that boils down Alessie and Lusardi's (1997) consumption model when $\gamma > 0$ and $\eta = 0$ and Hall's PIH (1978) when $\gamma = \eta = 0$.

3. The individual's closed form consumption function

The Euler equation is a recursive consumption function, which is here possible to rewrite as a function of the individual's consumptions in the first period as follows:[6]

$$c_t = \frac{(1+g-\gamma) - g\gamma^t}{1-\gamma} c_0 + \eta\left[\sum_{t=2}^{T-2-j}\sum_{j=0}^{T}\gamma^j\Delta\bar{c}_t\right], \quad \forall t \geq 2. \tag{15}$$

I use the assumption that $c_1 = (1+g)c_0$ (the individual's consumption changed with rate g between period $t=0$ and $t=1$) in order to receive a simple expression for the consumption in the first period.[7] A consumption path derived from Eq. (15) will satisfy the Euler equation. When I consider the individual's budget constraint it is possible to derive his closed form consumption function. By placing (15) in (5), it is possible to write the individual's first period consumption as

$$c_0 = \frac{\Lambda}{(1+g)\Lambda + \Phi - \Theta}\left[a_t + \sum_{t=0}^{T}\left(\frac{1}{1+r}\right)^t y_t - \eta\sum_{t=2}^{T-2-j}\sum_{j=0}^{T}\gamma^j\Delta\bar{c}_t\right], \tag{16}$$

where

$$\Lambda = (1+\gamma)(1+r-\gamma)r(1+r)^T, \tag{17}$$

$$\Phi = (1+g-\gamma)(1+r-\gamma)r((1+r)^T - 1), \tag{18}$$

$$\Theta = g\,r\gamma((1+r)^T - \gamma^T). \tag{19}$$

Eq. (15) together with Eq. (16) give a unique consumption path that satisfies both the Euler equation and the individual's budget constraint.

In order to discuss one of the aims in this paper, I need to derive a consumption function for the individual that depends on the individual's previous consumption. Hence, I rewrite the intertemporal budget constraint (5) by substituting in c_τ from (1), and after some manipulation I solve for the present discounted value of c_τ^*:[8]

$$\sum_{\tau=t}^{T}\left(\frac{1}{1+r}\right)^\tau c_\tau^* = -\gamma c_{\tau-1} - \eta\sum_{\tau=t}^{T}\left(\frac{1}{1+r}\right)^\tau\bar{c}_\tau + \left[1 - \frac{\gamma}{1+r}\right]\left(a_\tau + \sum_{\tau=t}^{T}\left(\frac{1}{1+r}\right)^\tau y_\tau\right). \tag{20}$$

Using Lemma 1, I can derive from (20) a recursive consumption function, which satisfies the individual's budget constraint, for the individual:[9]

$$\begin{aligned} c_\tau = &\underbrace{\frac{(1+r)^T - 1}{(1+r)^{T+1} - 1}\gamma c_{\tau-1}}_{i} + \underbrace{\frac{(1+r)^T - 1}{(1+r)^{T+1} - 1}\eta\bar{c}_\tau}_{ii} \\ &\underbrace{-\eta\frac{r(1+r)^T}{(1+r)^{T+1} - 1}\sum_{\tau=t+1}^{T}\left(\frac{1}{1+r}\right)^\tau\bar{c}_\tau}_{iii} \\ &+\underbrace{\left(1 - \frac{\gamma}{1+r}\right)\frac{r(1+r)^T}{(1+r)^{T+1} - 1}\left[a_\tau + \sum_{\tau=t}^{T}\left(\frac{1}{1+r}\right)^\tau y_\tau\right]}_{iv}. \end{aligned} \tag{21}$$

From Eq. (21) it follows that the individual's consumption level at time τ depends on four features: (i) *a habit level* of consumption—the individual's own previous consumption, (ii) *a keeping-up effect* —current consumption by relevant others, (iii) *a fear (future potential disutility) of falling behind effect* —the future consumption by relevant others, and (iv) *the wealth effect*, which is also present in the PIH, although it is reduced when the individual has a habit-formation behavior ($\gamma > 0$).[10] The general recursive consumption function in Eq. (21) boils down to two other consumption functions found in the literature: Hall's (1978) PIH when

[5] My only interest here is the interior solution to the intertemporal maximization problem.

[6] In order to derive this equation I use the Euler equation. I first define the individual's consumption in period $t=1$. Then I lead the Euler equation one period and use the information from the consumption in period $t=1$, and so forth.

[7] This corresponds to the case when the individual's utility in the first period depends merely on past consumption. It is not until the second period that the individual's utility depends on the consumption by his relevant others.

[8] We can easily verify that if $\gamma = 0$, the intertemporal budget constraint collapses to an ordinary "textbook" intertemporal budget constraint, and hence, if $\alpha = 0$, it collapses to Alessie and Lusardi's (1997) intertemporal budget constraint.

[9] We know that Lemma 1 implies $\sum_{\tau=t}^{T}(1/(1+r))^\tau c_\tau^* = ((1+r)^{T+1} - 1)/(r(1+r)^T)c_\tau^*$.

[10] The number of lagged variables depends on how many lagged variables are included in the c_τ^* measure.

$\gamma = \eta = 0$, which shows that an individual's consumption at time τ is equal to the annuity value of his lifetime resources and is constant over time, and the one in Alessie and Lusardi (1997), when $\gamma > 0$ and $\eta = 0$. The individual's consumption at time τ then depends partly on his previous consumption and partly on his permanent income.

3.1. The impact of the individual's permanent income

It is possible to rewrite Eq. (21) by using concepts such as the individual's *permanent income* and the *permanent consumption* by his relevant others,[11] where the individual's permanent income (y_τ^p) is the annuity value of the sum of the current *non-human wealth* (a_τ) and *h* uman wealth (present discounted value of future income), and where the permanent consumption by relevant others ($\bar{c}_{\tau+1}^p$) is the annuity value of the present discounted value of future consumption. Thus, the individual's consumption in period τ is:

$$c_\tau = \gamma\Psi c_{\tau-1} + \eta\Psi\bar{c}_\tau - \eta\bar{c}_{\tau+1}^p + \left(1 - \frac{\gamma}{1+r}\right) y_\tau^p, \tag{22}$$

where $\Psi = ((1+r)^T - 1)/((1+r)^{T+1} - 1)$, $y_\tau^p = r(1+r)^T/((1+r)^{T+1} - 1)(a_\tau + \sum_{\tau=t}^{T}(1/(1+r))^\tau y_\tau)$, and $\bar{c}_{\tau+1}^p = r(1+r)^T/((1+r)^{T+1} - 1)\sum_{\tau=t+1}^{T}(1/(1+r))^\tau \bar{c}_\tau$.

We can see from (22) that a change in permanent income has the same effect on the individual's consumption as if the psychological consumption measure would merely include a habit formation behavior; i.e., the individual's utility depends on $c_\tau^* = c_\tau - \gamma c_{\tau-1}$. Thus, the individual's consumption changes with his permanent income as

$$\frac{\partial c_\tau}{\partial y_\tau^p} = 1 - \frac{\gamma}{1+r}. \tag{23}$$

From Eq. (23) we can see that if the individual increases his concern about his previous consumption, i.e., his habits, then a change in his permanent income changes his consumption to a lesser extent.

$$\frac{\partial^2 c_\tau}{\partial y_\tau^p \partial\gamma} = -\frac{1}{1+r} < 0. \tag{24}$$

When the individual has a negative change in his permanent income, stronger habits (higher γ) implies that the individual's consumption decreases by a smaller amount than with weaker habits. This smoother reduction comes from the fact that it takes time for an individual to alter his consumption habits.

3.2. The impact of the consumption by relevant others

How does the consumption at time τ depend on a change in the degree of concern about the consumption by relevant others, i.e., with η?

$$\frac{\partial c_\tau}{\partial\eta} = \underbrace{\Psi\bar{c}_\tau}_{i} - \underbrace{\bar{c}_{\tau+1}^p}_{ii}. \tag{25}$$

The individual's consumption is affected in two ways: (i) The first effect stems from the individual's wish to *keep up* with the consumption levels of his relevant others at time τ; this is captured by the first term in (25). This implies that the individual's consumption level adjusts upward by a fraction of the current consumption by relevant others, i.e., the individual's consumption to some degree tracks the consumption levels of his relevant others. (ii) The second effect arises if the individual perceives the future consumption path of the relevant others as painful—i.e., it reduces the individual's utility. This is captured by the last term in (25), where we can see how the individual's consumption is negatively affected by his relevant others' future consumption. Hence, the higher the future permanent consumption among his relevant others, the more the individual's consumption at time τ is reduced.

3.2.1. A temporary increase in the consumption by relevant others

Consider a temporary increase in the consumption by relevant others at current time, τ. This may be for example a bonus, i.e., an extra amount of money. This increase boosts the individual's current consumption, since he wishes to keep up with them:

$$\frac{\partial c_\tau}{\partial\bar{c}_\tau} = \eta\Psi > 0. \tag{26}$$

This effect may impact the individual's consumption growth, and hence may provide some insight into why consumption grows higher than income.

> "... in each of the past three years, real consumer outlays have grown faster than real aftertax income."
> —Business Week 17/4 2006 (*U.S.: It's Way Too Early to Count Consumers Out*)

The individual knows that the consumption by relevant others increases at time τ but not at time $\tau + 1$. He will therefore increase his consumption at time τ to not lose status.

3.2.2. A permanent increase in the consumption by relevant others

Veblen (1934) states that it is the best-off members in a society who establish the consumption standard for the rest, and then people below wish to emulate their consumption. Duesenberry (1949, p. 101) claims that "Low-income groups are affected by consumption of high-income groups but not vice versa.", i.e., individuals make upward comparisons when they evaluate their consumption level. Similar thoughts, i.e., are voiced by, e.g. Schor (1998, p. 4) who argues that individuals "make comparison with, or choose, a 'reference group,' people whose income are three, four, or five times his or her own." She finds that individuals with lower financial status than their reference groups save significantly less than individuals with better financial status than their reference groups.

If the increase in the consumption by relevant others is permanent, i.e., also $\bar{c}_{\tau+1}^p$ changes and not just $\bar{c}_t$, then the individual's consumption changes as

$$\frac{\partial c_\tau}{\partial\bar{c}_\tau} + \frac{\partial c_\tau}{\partial\bar{c}_{\tau+1}^p} = \eta\Psi - \eta = \eta(\Psi - 1) < 0, \quad \text{since } \Psi < 1. \tag{27}$$

Hence, the individual's consumption is negatively affected by a permanent consumption increase among relevant others.[12]

4. Marginal propensity to consume

4.1. A review of marginal propensity to consume

Keynes (1936, p. 36) argues that "The fundamental psychological law... is that men are disposed, as a rule and on the average, to increase their consumption as their income increases, but not by as much as the increases in their income." Hence, the Keynesian consumption function hypothesizes that if an individual's current income rises/falls by one unit, then his consumption should rise/fall proportionally with the MPC, which is less than 1. This is the *absolute*

[11] It would also be possible to rewrite the permanent consumption by relevant others as permanent income if we assume a constant saving rate.

[12] This effect is a result of the individual's intertemporal budget constraint, which implies that his present discounted value of consumption cannot be larger than the present discounted value of his human and non-human wealth.

income hypothesis. Another venue is Friedman's (1957) *permanent income hypothesis*, where MPC is determined by the relative variations in permanent and transitory incomes. When the variation in permanent income is much greater than the variation in transitory income, consumption rises almost one-for-one with current income. Intuitively, an individual's consumption increases when his permanent income increases. Hall (1978) derives his version of the *permanent income hypothesis* within a framework of explicit intertemporal utility maximization, rather than merely asserting a proportional dependence between consumption and permanent income, and predicts that the MPC is 1. Thus, any change in the individual's permanent income affects his consumption one-for-one. Duesenberry (1949) rejects this symmetric notion, claiming that once consumption habits and status are acquired, it is hard for an individual to alter them. He therefore postulates the *relative income hypothesis*. At a certain income level, certain status and certain consumption habits are formed, and these are not completely abandoned if income falls; it takes time for individuals to adjust consumption downward. Alessie and Lusardi (1997) derive a recursive consumption function from Duesenberry's (1949) notion. The implication is that when an individual cares both about his current and previous consumption, his MPC is smaller than in Hall's (1978) model of PIH. Although I use perfect foresight about future flows, the MPC is the same as if the individual would have a stochastic labor income process.

We are now ready to compare the different marginal propensities to consume from Hall's (1978) model of PIH, from Alessie and Lusardi (1997), and from Eq. (22).

4.2. The individual's marginal propensity to consume

After deriving the individual's recursive consumption function, it is possible to derive and study the individual's MPC. The traditional definition of an individual's MPC is:

> *MPC defines how much an individual's consumption changes when his permanent income is changed by one unit.* [13]

This definition is used by, e.g. Keneys. However, when we now allow the individual's utility to depend on his psychological consumption as in Eq. (1), instead of on his absolute consumption, it is possible to add a new definition of the individual's MPC.

4.2.1. An increased permanent income affects MPC

The individual's recursive consumption function is the same as Eq. (22):

$$c_\tau = \gamma\Psi c_{\tau-1} + \eta\Psi\bar{c}_\tau - \eta\bar{c}^p_{\tau+1} + \left(1 - \frac{\gamma}{1+r}\right) y^p_\tau. \tag{28}$$

Differentiating Eq. (28) with respect to y^p_τ yields the traditional measure of an individual's MPC (we did the exact same procedure in Section 3.1 but never introduced the concept of MPC):

$$\text{mpc} = \frac{\partial c_\tau}{\partial y^p_\tau} = 1 - \frac{\gamma}{1+r}. \tag{29}$$

Hence, if the individual would have had one unit higher permanent income, his consumption at time τ would change by $1-(\gamma/(1+r))$ units. We can see that the individual's MPC depends merely on how much he cares about his previous consumption (γ). This is also an individual's MPC in the model by Alessie and Lusardi (1997), hence $\text{mpc} \equiv \text{mpc}^{A\&L}$.

The other extreme case is when $\gamma = 0$, which corresponds to Hall's (1978) model of PIH. Then, it is easy to see that the individual's MPC is:

$$\text{mpc}^{\text{PIH}} = \frac{\partial c_\tau}{\partial y^p_\tau} = 1. \tag{30}$$

This implies that if the individual's permanent income is one unit higher, then consumption increases under Hall's (1978) model of PIH by the corresponding amount.

However, when we now allow psychological and sociological aspects to enter the economic models, we need to have a broader definition of the individual's MPC. I argue that we should also include the effect of the consumption of relevant others, both the current ($\bar{c}_{\tau+1}$) and future permanent consumption ($\bar{c}^p_{\tau+1}$), in the definition of the MPC, since the effect of the individual's own permanent income on his consumption is only one of several effects. I therefore put forward another definition of the individual's MPC, which takes into account the consumption of the individual's relevant others. I introduce the individual's *total* MPC as

> *The total MPC defines by how much an individual's consumption changes when his permanent income is changed by one unit, and at the same time the permanent consumption among his relevant others increases by one unit.*

4.2.2. The consumption by relevant others affects MPC

We assume that structural change in the economy has a permanent effect on the consumption by relevant others; both c_τ and $\bar{c}^p_\tau$ change in the same direction. The individual's *total* MPC, with respect to a permanent increase in the consumption by his relevant others is hence:

$$\text{mpc}^{\text{total}} = \frac{\partial c_\tau}{\partial \bar{c}_\tau} + \frac{\partial c_\tau}{\partial \bar{c}^p_{\tau+1}} + \frac{\partial c_\tau}{\partial y^p_\tau} = 1 + \eta\Psi - \eta - \frac{\gamma}{1+r}, \tag{31}$$

where $\Psi < 1$. With the assumptions that $\gamma > 0$ and $0 < \eta < 1$, it is possible to formulate the following proposition:

Proposition 1. *When an individual's utility depends on both his own current and previous consumption in addition to the current consumption by his relevant others, his MPC is lower than if he had merely had a habit formation behavior, as in Alessie and Lusardi (1997), while the MPC is the highest in Hall's (1978) PIH model.*

Proof 1. The inequality $1 = \text{mpc}^{\text{PIH}} > \text{mpc}^{A\&L} = 1-(\gamma/(1+r))$ holds when $\gamma \in (0,1]$, since we have that $\gamma/(1+r) > 0$. Furthermore, when $\gamma \in (0,1]$ and $\eta \in (0,1)$, we have that $1 + \eta(\Psi-1) - (\gamma/(1+r)) = \text{mpc}^{\text{total}} < \text{mpc}^{A\&L} = 1-(\gamma/(1+r))$ holds since $\eta(\Psi-1) < 0$. Hence, it is obvious that $\text{mpc}^{\text{PIH}} > \text{mpc}^{A\&L} > \text{mpc}^{\text{total}}$. □

Hence, when $\Psi < 1$, $\gamma > 0$, and $0 < \eta < 1$, we can conclude that the *total* MPC is smallest: $\text{mpc}^{\text{PIH}} > \text{mpc}^{A\&L} > \text{mpc}^{\text{total}}$.

Thus, if the individual has both a habit-formation behavior and cares to some degree about the consumption among his relevant others, then his consumption is less sensitive to an increase in his permanent income and to the permanent consumption levels of his relevant others compared to if he merely has a habit-formation behavior and obviously if only his absolute consumption drives utility. This "smoothness" depends on the fact that the individual does not wish to fall behind the consumption among his relevant others in the future, and therefore he adjusts his consumption level less. Hence, this model may be better at explaining the "excess smoothness" phenomenon[14] found in the consumption data compared to earlier theories, which opens up for further research.

[13] One unit higher permanent income implies that the income in each period increases by one unit.

[14] See, e.g. Deaton (1992).

5. Concluding remarks

By looking at psychological and sociological arguments of what individuals' utility depends on, I extend Alessie and Lusardi's (1997) consumption model, in which individuals merely have habit-formation behaviors, by adding the notion that individuals also care about the consumption among their relevant others. I also derive a general closed form consumption function that boils down to the closed form consumption functions of Hall's (1978) PIH, or a habit-formation behavior such as in Alessie and Lusardi's (1997) consumption models.

The extension of Alessie and Lusardi's (1997) psychological consumption measures (that utility depends on) implies that the consumption among relevant others affects an individual's consumption in two ways: The individual's consumption (i) increases when the current consumption increases and (ii) decreases when the future permanent consumption by relevant others increases. Furthermore, a change in the consumption among relevant others does not affect the individual's *traditional* MPC. However, I show that the *total* MPC is lower compared to both Hall's (1978) and Alessie and Lusardi's (1997) MPC. This is a consequence of the fact that the individual does not wish to fall behind the consumption level of his relevant others in the future. Furthermore, this model may be better at explaining the "excess smoothness" which opens up for further research.

It should be possible to test whether an individual's consumption depends on both his own previous consumption and that seen among his relevant others, and whether new information regarding the individual's own future income and that among relevant others (relaxing the assumption of perfect foresight) affects consumption. This is in a sense analogous with papers in the happiness literature, where empirical evidence suggests that happiness of individuals is affected by the income level of relevant others; see, e.g. Ferrer-i Carbonell (2005).

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Appendix A

We know that an individual's MRS under certain assumptions is equal to (the same as Eq. (12)):

$$\frac{(\partial u(c^*_{t+1})/\partial c^*_{t+1}) - \gamma\beta(\partial u(c^*_{t+2})/\partial c^*_{t+2})}{(\partial u(c^*_t)/\partial c^*_t) - \gamma\beta(\partial u(c^*_{t+1})/\partial c^*_{t+1})} = 1. \quad (32)$$

Proposition 2. *The only admissible time series of psychological consumption,* $\{c^*_\tau\}_{\tau=t}^T$, *that satisfies* Eq. (32) *when* $T \to \infty$ *is:*

$$\frac{\partial u(c^*_t)}{\partial c^*_t} = \frac{\partial u(c^*_{t+1})}{\partial c^*_{t+1}} = \frac{\partial u(c^*_{t+2})}{\partial c^*_{t+2}} = \Omega, \quad \forall t, \quad (33)$$

and where Ω *is a constant.*

Proof 2. If the marginal utility of psychological consumption is not constant over time and $(\partial u(c^*_{t+1})/\partial c^*_{t+1}) \neq (\partial u(c^*_t)/\partial c^*_t)$, it is possible to calculate $(\partial u(c^*_{t+2})/\partial c^*_{t+2})$. In order for Eq. (32) to be satisfied,

$$\frac{\partial u(c^*_{t+2})}{\partial c^*_{t+2}} = \frac{1+\gamma\beta}{\gamma\beta}\frac{\partial u(c^*_{t+1})}{\partial c^*_{t+1}} - \frac{1}{\gamma\beta}\frac{\partial u(c^*_t)}{\partial c^*_t}. \quad (34)$$

Eq. (34) is a second order difference equation whose general solution is:

$$\frac{\partial u(c^*_{t+n})}{\partial c^*_{t+n}} = A + B\left(\frac{1}{\gamma\beta}\right)^n, \quad (35)$$

where A and B are arbitrary constants. When an individual has a habit-formation behavior, then $0 < \gamma\beta < 1$, and then Eq. (35) shows that the individual's marginal utility of psychological consumption is growing over time. When an individual's utility function is concave, then his psychological consumption, c^*_{t+n}, decreases over time, which implies that his absolute consumption also decreases over time. This is not a utility maximization, i.e., (2) is not maximized. Hence, Proposition 2 is true, and we can formulate Lemma 1. □

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Paper 3

Happiness at the University*

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Abstract

Based on Swedish survey evidence, professors are happier than lecturers; but employed academics with better self-reported publication lists are not happier than their colleagues. Both absolute wage and relative wage seem to affect happiness. Employed academics who earn more than faculty colleagues with the same academic position and gender are also happier. For those who just started their academic careers, the results show that students with relatively better exam results are not happier than their classmates. Moreover, it seems optimal for students' happiness to study 30-40 hours per week.

Employed academics with average or worse self-reported publication lists are more likely to think they will be happier in the future than colleagues with better self-reported publication lists. This finding is similar for students: Students with worse exam results are more likely to think they will be happier in the future than their classmates with better or average exam results. Hence, while relative academic performance does not seem to affect current happiness, it does seem to be negatively correlated with expected future happiness.

JEL classification: A22; D60; I31

Keywords: self-reported current happiness; self-reported expected future happiness; relative academic performance; comparison wage, employed academics; undergraduate students

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For most people, happiness is the main, if not the only, ultimate objective in life.
Ng, 1996, p. 1

1. Introduction

Happiness research is well established. Already four and half decades ago, in psychology, Cantril (1965) developed a questionnaire about life satisfaction. Today, researchers can even measure brain activity that corresponds to happiness (Layard, 2005).

In this paper, I analyze both current and expected future happiness at the university. To my knowledge, very little has been written about happiness at universities, i.e., among employed academics and undergraduate students. However, Ward and Sloane (2000) examined job satisfaction among Scottish academics and found that comparison wage influences overall job satisfaction and that the number of published papers influences the level of wage satisfaction. My notion is that employed academics at the university are also motivated by other things than people outside academia tend to be; i.e., they might care more about non-pecuniary aspects (Ward and Sloane, 2000). Since the wage structure in Swedish universities is relatively horizontal and depends mainly on academic position and age, one might conjuncture that employed academics are more concerned about relative academic performance than about their absolute wage. I also argue that students care about relative academic performance. For example, given better academic performance, there is a higher probability to receive higher initial income. It is important to explore whether students' relative academic performances affect their happiness, since this may give us new insights into way universities still suffer of social stratifications with respect to the beginners.

The econometric results indicate that employed academics with better self-reported publication lists are not happier than their colleagues. Somewhat on the contrary, those with average or worse publication lists are more likely to think they will be happier in the future than are colleagues with better publication lists. This may be because they expect improved future academic performance and advancements in both academic position and wage. Age seems to matter for expected future happiness: Younger employed academics expect improved future happiness to a higher extent than do older employed academics. Nonetheless, academic position matters for happiness. Professors are in general happier than lecturers[1]. This may be a result of the fact that they have a high degree of freedom in their work. Happiness seems to also be affected by both relative and absolute wage. Employed academics who earn more than faculty colleagues with the same academic position and gender are also happier. For those who

[1] Lektor in Swedish. A teaching position which requires a PhD. Broadly similar to the title lecturer in the U.S.

just started their academic careers, the results show that students with relatively better exam results are not happier than their classmates. Somewhat on the contrary, students with worse exam results than their classmates in fact expect increase future happiness to a larger extent than their classmates with average or better exam results. Additionally, among students, it seems to be optimal for one's happiness to have a work load of around 30-40 hours per week.

This paper has the following structure: Section 2 introduces the data and presents some descriptive statistics. Section 3 presents the econometric analyses and Section 4 the conclusions.

2. Data

The data used in this paper comes from a questionnaire and is cross-sectional. It is therefore not possible to conclude any causality effects, since causality may go in either direction, i.e., happier people may be more successful.[2] Nonetheless, the results may give an indication of a causal effect. At any rate, even correlation is interesting since it sheds more light on the topic of happiness at universities.

2.1 The questionnaire

The questionnaire consists of four sections: (i) background questions; (ii) choice experiment 1, which addresses the respondents' habit-formation behavior; (iii) choice experiment 2, which addresses the respondents' concern for relative consumption;[3] and (iv) questions about the respondents' characteristics. No monetary compensation or any other perks were given to the respondents. The choice experiments are beyond the scope of this paper. Most of the questions regarding background and characteristics are used in the happiness analyses.

In mid-January 2005, all 1,007 academics (professors and lecturers) registered as employed by the University of Gothenburg at the end of 2004 received the questionnaire through the university internal mail system. Those who did not answer received a reminder and a second identical questionnaire in mid-February 2005. It turned out that only 994 names were valid since people had resigned, were on leave of absence, were abroad, or had passed away. A total of 286 of the 994 questionnaires were returned, implying a response rate of 28.8% (27.7% and 30.8% for lecturers and professors, respectively). Since not all respondents answered all questions, only 247 of the returned questionnaires could be used. During the same time period,

[2] In fact, a growing body of literature argues that happier people are more successful (see, e.g., Lyubomirsky et al., 2005) in several life domains.
[3] See Andersson, 2008.

two groups of business students, two groups of social work students, and one group of mechanical engineering students were approached at the end of a lecture and asked whether they would like to – voluntarily – participate in a survey. In total 605 students took part in the experiment, which took an average of 20 minutes (approximately) to conduct. The participation rates for the business, social work, and mechanical engineering students were around 85%, 85%, and 99%, respectively. A total of 559 student questionnaires could be used. Hence, the number of respondent questionnaires from academics and students used in the analysis totaled 806.

For the employed academic population, information about the individuals' gender, age, wage, and academic position was collected. With a Wilcoxon-Mann-Whitney test (WMW test), it is possible to test whether the underlying distributions between those who answered the questionnaire and the population (all employed academics at the University of Gothenburg) are the same. The WMW tests indicate that I cannot reject the hypothesis that the population and the respondents have the same distributions with respect to gender ($p_{WMW}=0.7263$), age ($p_{WMW}=0.2525$), and academics position ($p_{WMW}=0.4865$), while I can reject the hypothesis with respect to absolute wage ($p_{WMW}=0.0808$).[4] Respondents had, on average, approximately 1,000 SEK higher monthly wages than those who did not respond. This is a difference, albeit small.

2.2 Happiness variables

2.2.1 Current happiness

The question about happiness read: "*How satisfied are you in general with your life these days?*".[5] The choices the respondents had were "extremely unhappy," "very unhappy," "rather unhappy," "neither unhappy nor happy," "rather happy," "very happy," and "extremely happy." These answers are assigned values from one to seven in the listed order.

Table 1 shows that women are on average happier than men, although the difference is only statistically significant for the students (*students:* $p_{ttest}=0.0277$, $p_{WMW}=0.0440$; *employed academics:* $p_{ttest},=0.1120$, $p_{WMW}=0.1438$).[6] Moreover, the WMW test indicates also that we can reject the hypothesis that the distributions of self-reported happiness are the same for female and male students. Furthermore, students are on average significantly happier than employed

[4] All p-values are reported in Appendix, Table A1.
[5] A similar question (*How satisfied are you with your life as a whole these days?*) is used in, e.g., Schwarz and Clore (1983) and Stutzer(2004). Another version (*All things considered, how satisfied are you with your life as a whole these days?*) is used in, e.g., Blanchflower and Oswald (2004) and Bruni and Stanca (2006).
[6] I test the mean difference between two groups with two independent samples t-test; its p-value is reported as p_{ttest}. The p-value for the WMW-test is reported as p_{WMW}. All p-values are reported in Appendix, Table A2.

academics ($p_{ttest}=0.0041$, $p_{WMW}=0.0007$). There is no significant difference in happiness between professors and lecturers ($p_{ttest}=0.1746$, $p_{WMW}=0.2418$).

Table 1: Self-reported happiness, distribution (percent), mean, and number of observations

	Extremely Unhappy	Very Unhappy	Rather unhappy	Neither unhappy nor happy	Rather Happy	Very happy	Extremely happy	Mean happiness*	No. obs.
Students	0.0	0.4	3.4	9.8	47.4	34.9	4.1	5.25	559
Women	0.0	0.0	2.1	9.8	45.7	38.7	3.7	5.32	328
Men	0.0	0.9	5.2	10.0	49.8	29.4	4.8	5.16	231
Employed	0.0	0.0	3.6	16.6	52.6	23.5	3.6	5.07	247
Professors	0.0	0.0	1.1	16.1	52.7	25.8	4.3	5.18	93
Associate professors	0.0	0.0	5.2	16.9	52.6	22.1	3.2	5.01	154
Women	0.0	0.0	1.1	17.0	48.9	28.4	4.5	5.16	88
Men	0.0	0.0	5.0	16.4	54.7	20.8	3.1	5.01	159

Note: * The mean is calculated as the ordinal values (see Table 6 for the values) times the number of observations for each category divided by the total number of observations.

2.2.2 Expected future happiness

The questionnaire also included a question regarding expected future happiness: "*Compared to your current general level of satisfaction, how satisfied do you think you will be in five years?*" The choices were "unhappier in the future," "neither happier nor unhappier in the future," and "happier in the future." These answers are assigned values from one to three in the listed order. Table 2 shows that students generally have higher expectations regarding future happiness than do employed academics ($p_{ttest}=0.0000$, $p_{WMW}=0.0000$). Among employed academics, lecturers have significantly higher expectations about future happiness compared to professors ($p_{ttest}=0.0527$, $p_{WMW}=0.0630$). Yet, there is no significant gender-difference in expectations about future happiness in either group of respondents (students $p_{ttest}=0.3126$, $p_{WMW}=0.3937$; employed $p_{ttest}=0.3810$, $p_{WMW}=0.3994$). Students and lecturers have significantly higher expectations about their future happiness than employed academics and professors, respectively. Easterlin (2001) argues that people in general typically report that they were less happy in the past and that they will be happier in the future. His explanation to this phenomenon is that people's aspiration levels change over time. For example, people know they will have higher wages in the future and therefore also think they will be happier. However, once they reach the future period and have higher wages, their aspiration levels have increased as well. This implies that their projected happiness is different from their experienced happiness. Easterlin's (2001) result is consistent with the results presented in Tables 1 and 2. His notion is more in line for the students, since the students on average have a higher current happiness than the employed academics and are also more optimistic regarding future happiness. In five years, the students will be in the labor market and will earn money;

their household budgets will be dramatically stronger, while the employed academics cannot expect similar wage increases over the same period.

Table 2: Self-reported expected future happiness, distribution (percent), mean, and number of observations

	Unhappier in the Future	Neither happier nor unhappier in the future	Happier in the future	Mean future happiness	Number of observations
Students	0.5	41.5	57.1	2.57	555
Women	0.0	40.5	58.2	2.59	324
Men	1.3	42.9	55.8	2.55	231
Employed	5.3	68.8	25.1	2.20	245
Professors	8.6	71.0	20.4	2.16	93
Lecturers	3.2	67.5	27.9	2.22	152
Women	6.8	69.3	22.7	2.11	88
Men	4.4	68.6	26.4	2.25	159

Note: Some respondents did not answer this question.

2.3 Relative performance variables

2.3.1 Employed academics

The questions about relative academic performance were: (i) "*Try to estimate how good you are at teaching compared to your permanently employed department colleagues,*" and (ii) "*Try to compare the quality of your academic list of publications to the quality of those of your permanently employed department colleagues.*" The possible answers to both questions were "much worse," "worse," "average," "better," and "much better," carrying a value from one to five in the listed order. I chose colleagues as the reference group since they work at the same department and generally interact with the respondents, e.g., in the corridors and on coffee or lunch breaks. Clark and Senik (2009) show that colleagues are the most frequently cited reference group among respondents of a large scale European Social Survey. Furthermore, Senik (2009) shows that using colleagues as reference group has a larger impact on peoples' behavior than relying on a more general comparison, such as ranking on the social ladder.

Table 3: Self-reported relative quality of publication list: distribution (percent), mean, and number of observations

	Much worse than average	Somewhat worse than average	Average	Somewhat better than average	Much better than average	Mean exam results	Number of observations
Academics	2.4	8.9	51.8	29.1	7.7	3.17	247
Professors	0.0	0.0	34.4	49.5	16.1	3.82	93
Lecturers	3.9	14.3	62.3	16.9	2.6	3.00	154
Women	1.1	8.0	62.5	21.6	6.8	3.25	88
Men	3.1	9.4	45.9	33.3	8.2	3.34	159

Table 3 shows, not surprisingly, that professors have significantly better self-assessed publication lists ($p_{ttest}=0.0000$, $p_{WMW}=0.0000$). Table 4 shows on the other hand that there is no difference in relative self-assessed teaching performance between professors and lecturers ($p_{ttest}=0.8189$, $p_{WMW}=0.8807$). There is no gender difference in self-assessed quality of publication lists ($p_{ttest}=0.4191$, $p_{WMW}=0.2122$) or self-assessed relative teaching performance ($p_{ttest}=0.2346$, $p_{WMW}=0.2357$).

Table 4: Self-reported relative teaching performance: distribution (percent), mean, and number of observations

	Much worse than average	Somewhat worse than average	Average	Somewhat better than average	Much better than Average	Mean performance	Number of Observations
Academics	0.0	0.0	69.2	29.1	1.6	3.32	247
Professors	0.0	0.0	68.8	29.0	2.2	3.33	93
Lecturers	0.0	0.0	69.5	29.2	1.3	3.32	154
Women	0.0	0.0	68.8	29.0	2.2	3.27	88
Men	0.0	0.0	69.5	29.2	1.3	3.35	159

Tables 3 and 4 shows that, all in all, 31 percent stated that they are better teachers than average ("much better" and "better") and that 37 percent felt they have better publication lists than average ("much better" and "better"). Only 2 percent stated that their teaching skills are below average and 11 percent state that their publication lists are below average. Since the number of employed academics who rated their teaching skills to be below average is so small, I decided to drop these individuals and only use: (i) relatively better teaching performance (31 percent) and (ii) average teaching performance (69 percent). The fact that so few rated their teaching as below average may be due to that many individuals believe they are better teachers than they actually are, i.e., there is an upward bias in the answers. For example, Talyor and Brown (1994) argue that people have positive biases on their self-perception. According to Baumeister (1998) people tend to judge others in areas in which they themselves are good. This may imply that people tend to emphasize some of their, e.g., articles since they believe their domain is more important than that of their colleagues. Conversely, they may also place a lower weight on colleagues' highly ranked articles since these are not in their own domain.

2.3.2 Undergraduate students

Relative academic performance was assessed by having the students respond to the following: "*Try to estimate how good your exam results are compared to those of your classmates.*" The possible responses were "much worse," "worse," "average," "better," and "much better." Each possible response carries a value from one to five in the listed order. Tables 5 shows that 23 percent of the students claimed to have above average exam results and that 72 percent said they have average exam results. A larger proportion of male than of female students answered that they are better or much better than average. The mean exam results also differ significantly between the two groups ($p_{ttest}=0.0002$, $p_{WMW}=0.0001$).

Table 5: Self-reported relative exam result: distribution (percent), mean, and number of observations

	Much worse than average	Somewhat worse than average	Average	Somewhat better than average	Much better than average	Mean exam results	Number of observations
Students	0.7	5.4	71.6	20.8	1.6	3.17	559
Women	0.6	3.4	82.0	13.7	0.3	3.10	328
Men	0.9	8.2	56.7	30.7	3.5	3.28	231

2.4 Control variables

2.4.1 Comparison wage

According to Frey and Stutzer (2002a), economists have learned from happiness research in the sense of social comparison. Happiness depends on both relative and absolute wage (e.g., Luttmer, 2005). In general there is an inverted u-shaped relationship between wage and happiness (e.g., Easterlin, 2001, 1995, 1974; Frey and Stutzer, 2002b; Oswald, 1997; Clark and Oswald, 1996; and Veenhoven, 1993. There are various ways of calculating comparison (relative) wages. Clark and Senik (2009) show that individuals with colleagues as their reference group are on average happier than individuals with friends as their reference group. Using the register data of the employed academics' wages, it is possible to construct comparison wages. I construct two types of comparison wages: (i) academic position and faculty[7] (comparison wage 1) and (ii) academic position, faculty and gender – a kind of gender comparison (comparison wage 2). The latter is due to the fact that there exists, in society, an unexplained wage differential between men and women. According to the WMW test, it is not possible to reject the hypothesis that the distributions are the same for the employed academics who answered the questionnaire and the population (all University of Gothenburg employees), with respect to both comparison wage 1 ($p_{ttest}=0.1975$, $p_{WMW}=0.2530$) and comparison wage 2 ($p_{ttest}=0.2483$, $p_{WMW}=0.3411$).

2.4.2 Other control variables

The questionnaire included a battery of control variables for the regression analyses, e.g., respondents' age, gender, marital status, occupation, self-reported health status, and the extent

[7] I do not have register information about which respective departments the academic staff belong to; only their faculty belonging. In the Swedish higher education system, "faculty" refers to an umbrella of departments that are interrelated in some way. For example, the departments of economics, business administration, law and economic history normally belong to the same faculty.

of his/her circle of friends. It also included questions about leisure activities, purchasing power during childhood, and attitude toward fashion trends.

Table 6: Means and standard deviations (within parentheses) for the two categories of respondents

		Employees		Students	
Variable	Options and their categories	Mean	Std.	Mean	Std.
Dummy female	0 ,1 (male, female)	0.36	-	0.59	-
Age	in years	53.5	8.64	24.8	6.13
Old students	25 years or older	-	-	0.33	0.20
Dummy single	single, divorced, or widow(er)	0.12	-	0.45	-
Friends	1, 2, 3, 4, 5 (has none ,…, very many)	2.96	0.70	3.28	0.72
Many friends	4, 5 (many, very many)	0.18	-	0.33	-
Health	1, 2, 3, 4, 5 (very bad,…, very good)	4.02	0.77	4.15	0.71
Good health	4, 5 (good, very good)	0.77	-	0.86	-
Purchasing power childhood	1, 2, 3, 4, 5 (very much worse,…, very much better)	3.13	0.76	3.29	0.76
High purchasing power	4, 5 (somewhat or very much better)	0.30	-	0.38	-
Average purchasing power	3 (average)	0.55	-	0.51	-
Dummy party smoker	party smoker	0.05	-	0.14	-
Dummy smoker	Smoker	0.06	-	0.09	-
Concerned with fashion trends	1, 2, 3, 4, 5 (very little,…, very high)	2.31	1.03	3.25	1.06
Alcohol consumption	1, 2, 3, 4, 5, 6, 7 (never drink,…, nearly daily)	2.96	1.35	3.73	1.27
Much alcohol	7, 6 (nearly daily, 2-4 times per week)	0.46	-	0.17	-
Average alcohol	5, 4, 3 (1 time per week, less than 1 time per month)	0.47	-	0.73	-
Weekly training	1, 2, 3, 4 (zero times,…, more than 5 times)	2.24	0.75	2.22	0.83
Much physical exercise	3, 4 (3 or more times per week)	0.32	-	0.38	-
Average physical exercise	1, 2 (one or two times per week)	0.55	-	0.41	-
TV watching (daily)	1, 2, 3, 4, 5 (zero hours,…, more than 3 hours)	2.49	0.76	2.94	0.94
Much TV watching	4,5 (2 hours or more per day)	0.06	-	0.24	-
No/little TV watching	1,2 (0 to 2 hours per day)	0.53	-	0.33	-
Dummy professor	academic position	0.38	-	-	-
Relative teaching performance	1, 2, 3, 4, 5 (much worse than avg.,.., much better than avg.)	3.32	0.50	-	-
Relatively better	4,5 (somewhat or much better than average)	0.31	-	-	-
Average teaching	3 (average)	0.69	-	-	-
Relative publication list	1, 2, 3, 4, 5 (much worse than avg.,…, much better than avg.)	3.31	0.83	-	-
Relatively better	4, 5 (somewhat or much better than average)	0.37	-	-	-
Average	3 (average)	0.52	-	-	-
ln wage	Ln(wage is in SEK)	10.46	0.20	-	-
Relative wage 1	Wage/comparison wage 1*	1.01	0.11	-	-
Relative wage 2	Wage/comparison wage 2**	1.01	0.12	-	-
Fair wage	1, 2, 3, 4, 5 (very much lower,.., very much higher)	2.70	0.70	-	-
More than fair wage	4,5, (a bit higher, much higher wage than fair wage)	0.06	-	-	-
Fair wage	3 (fair wage)	0.58	-	-	-
Relative exam results	1, 2, 3, 4, 5 (much worse than avg.,…, much better than avg.)	-	-	3.17	0.57
Relatively better exam results	4, 5 (somewhat or much better than average)	-	-	0.22	-
Average exam results	3 (average)	-	-	0.72	-
Hours of studying (weekly)	1, 2, 3, 4, 5, 6, 7 (less than 10 h,…, more than 60 h)	-	-	3.42	1.25
Much studying >= 40 h	5, 6, 7 (40 or more hours per week)	-	-	0.19	-
Not much studying <= 30 h	1, 2, 3 (30 or less hours per week)	-	-	0.55	-

*Note: avg. means average.*relative wage 1 is the average wage per faculty and academic position, while **relative wage 2 is the average wage per faculty, academic position and gender.*

3. Econometric analyses

The coefficients of the models for current happiness are estimated by both an ordinary least square (OLS) and an ordered probit (presented in Appendix, Tables A3 and A4) as a robustness check. Despite that the dependent variable is ordinal, happiness regression results from an OLS are very similar to those of ordered analysis (see Ferrer-i-Carbonell and Frijters, 2004). This also tends to be the case in this paper; see Tables 7 and 8, and A3 and A4 in Appendix. The coefficients of the models for future expected happiness are estimated by a logistics regression. Since I have two respondent categories, different explanatory variables are used for the two categories.

3.1 The happiness of the academics – results

3.1.1 The importance of relative performance

The empirical evidence presented in Tables 7 and 8 indicate that individuals with better self-reported academic performance are generally not happier. This result holds for both respondent categories, i.e., employed academics and undergraduate students. The results seem to be quite robust since the coefficients of the hypothesis variables are approximately the same with or without the behavior variables. Moreover, Tables 7.1 and 8.1 present evidence that there is no interaction between self-reported academic performance and gender; i.e., the coefficients for the hypothesis variables are not significantly different from zero in any of the gender regressions as in the pooled regressions in these Tables. Hence, there are no interaction effects. This result differs somewhat from Ward and Sloane's (2000) findings. They found for example that an increased number of published papers yields a higher self-stated wage satisfaction among males than among females; i.e., at a given wage, men with relatively good publication lists have higher levels of wage satisfaction than women with relatively good publication lists. Moreover, Table 8.2 presents evidence that there is no interaction between academic performance and social class[8] among the students (social class is built from the variable self-stated purchasing power during their childhood).

However, there is a possibility of a downward bias in the coefficients for the variables *good teacher* and *good publication* in Table 7 due to the fact that there is no data on hours worked, i.e., work intensity. This will be the case if, as commonly assumed, happiness is negatively affected by working hours, *ceteris paribus*, and *good publications* and *good teacher* are

[8] High, average, or low purchasing power and average purchasing power during childhood, found in Table 6, are proxies for socio-economic classes.

positively affected by the number of working hours. Right now, the coefficients of relative academic performance reflect both the positive side of performing well academically and the negative side that better academic performance may require a higher work load. Pouwels et al. (2008) found that individuals' purchasing power effect (wage) tends to be underestimated if their number of hours worked is not included in the regression. Table 8 shows that students who study more than 40 hours or less than 30 hours a week are unhappier than those who study 30-40 hours.[9] Hence, there is evidence that studying "just enough" seems to be optimal for students to maximize their happiness. This is in some way consistent with Chan et al. (2005), who found that the students at an Australian university who claimed to have good time management skills were happier than others.[10] Another interpretation of this result is that unhappy students are not able to study for more than 30 while for students who study more than 40 hours per week the work load crowds out leisure time activities.

3.1.2 The importance of comparison wage

Comparison wages can be calculated in many ways. Clark and Senik (2009) show that people often use colleagues as their reference group. It is more or less common knowledge that there exists, in society, a gender differential in wages. Heywood (1993) argues that employees have a relatively good understanding of their wages in comparison to those of both male and female colleagues. Given this, e.g., a female professor or female lecturers should calculate her relative wage as her wage level in comparison to the wages of females at her faculty, conditional on that they have the same academic position. The same applies for males. They would like to be above the comparison level for males in order to be happier, and if they include females in the calculation, it lowers the comparison wage.

Table 7 indicates that there may be a gender aspect when employed academics calculate their comparison wage; relative wage 2 is significant while relative wage 1 is not. Hence, employed academics who earn more than the comparison wage level, when it is based on the wages of faculty colleagues with the same gender and academic position, are happier, *ceteris paribus*. My explanation is that individuals know there exists a gender differential in wage in society and therefore use this knowledge when they calculate their comparison wage level.

[9] For the students, I have information on their self-reported work hours. I test whether the coefficients of relative academic achievement are smaller (downward biased) when work hours are excluded from the regression. This is due to the negative effect that relative academic achievement may also require more work hours. I find that the coefficients are larger when work hours are included in the regression. Hence, there may be a downward bias effect of the coefficients of relative academic achievement when working hours are excluded.

[10] Chan et al. (2005) define good time management as having sufficient recreational and entertainment time outside home, balancing work and university activities well, and being able to meet deadlines or achieve goals in school.

Table 7: OLS regressions with happiness scores as dependent variable for the employed academics

	Model 1		Model 2		Model 3		Model 4	
Professor	0.595**	(0.28)	0.651**	(0.27)	0.656**	(0.29)	0.721***	(0.27)
Female	0.279**	(0.11)	0.295***	(0.11)	0.205*	(0.11)	0.222**	(0.11)
Age	-0.191***	(0.06)	-0.193***	(0.06)	-0.188***	(0.07)	-0.190***	(0.07)
Age square	0.002***	(0.00)	0.002***	(0.00)	0.002***	(0.00)	0.002***	(0.00)
Single	-0.188	(0.14)	-0.204	(0.14)	-0.129	(0.13)	-0.147	(0.13)
Good health (stated)	0.535***	(0.12)	0.543***	(0.12)	0.516***	(0.12)	0.526***	(0.12)
Average childhood (in purchasing power)	0.183	(0.15)	0.190	(0.15)	0.232	(0.15)	0.241	(0.15)
Good childhood (in purchasing power)	0.241	(0.15)	0.242	(0.15)	0.289*	(0.15)	0.291*	(0.15)
ln(wage)	43.338*	(24.28)	44.835*	(23.07)	44.203**	(19.74)	45.645**	(19.03)
(ln(wage))^2	-2.108*	(1.16)	-2.188**	(1.10)	-2.153**	(0.94)	-2.231**	(0.90)
Good teacher (better than average)	0.124	(0.11)	0.127	(0.11)	0.121	(0.11)	0.124	(0.11)
Good publication (better than average)	0.018	(0.20)	0.021	(0.20)	-0.078	(0.20)	-0.073	(0.20)
Average publication (average)	0.033	(0.20)	0.033	(0.20)	-0.008	(0.19)	-0.006	(0.19)
Relative wage 1	1.443	(0.96)			1.482	(0.95)		
Relative wage 2			1.618*	(0.90)			1.693**	(0.85)
Many friends					0.202*	(0.12)	0.193	(0.12)
Party smoker					-0.519***	(0.15)	-0.517***	(0.15)
Smoker					0.079	(0.19)	0.090	(0.19)
High fashion trend					0.267	(0.17)	0.267	(0.16)
Some fashion trend					0.237*	(0.12)	0.243*	(0.12)
Much alcohol					-0.210	(0.22)	-0.216	(0.22)
Average alcohol					-0.379*	(0.20)	-0.382*	(0.21)
Much physical exercise					-0.069	(0.17)	-0.074	(0.17)
Average physical exercise					0.002	(0.15)	-0.005	(0.15)
Much TV					-0.541***	(0.20)	-0.553***	(0.20)
No/little TV					0.098	(0.10)	0.096	(0.10)
More than fair wage (stated)					-0.171	(0.29)	-0.171	(0.29)
Fair wage (stated)					0.060	(0.13)	0.052	(0.13)
Constant	-215.099*	(127.50)	-222.221*	(121.33)	-219.163**	(104.36)	-225.890**	(100.74)
Observations	247		247		247		247	
R^2	0.17		0.18		0.27		0.28	

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7.1: OLS regressions, Model 4 (Table 7), with happiness scores as dependent variable for the employed academics by gender

	Model 4 All	*Model 4 Female*	*Model 4 Male*
Good teacher (better than average)	0.124	-0.007	0.119
	(0.11)	(0.22)	(0.13)
Good publication (better than average)	-0.073	-0.125	-0.053
	(0.20)	(0.31)	(0.26)
Average publication (average)	-0.006	-0.238	0.125
	(0.19)	(0.32)	(0.23)
All other variables	YES	YES	YES

Observations	247	88	159
R^2	0.28	0.44	0.33

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: OLS regressions with happiness scores as dependent variable for the undergraduate students

Students	*Model 1*		*Model 2*	
Female	0.143^{*}	(0.07)	0.111	(0.08)
Older than 24 years	-0.343^{***}	(0.08)	-0.172^{**}	(0.08)
Single	-0.419^{***}	(0.07)	-0.407^{***}	(0.07)
Average childhood (in purchasing power)	0.075	(0.12)	0.054	(0.11)
Good childhood (in purchasing power)	0.320^{**}	(0.12)	0.207^{*}	(0.12)
Good exam results (better than average)	0.156	(0.19)	0.107	(0.18)
Average exam results (average)	0.080	(0.18)	0.035	(0.17)
Much studying (more than 40 h)	-0.225^{**}	(0.10)	-0.241^{**}	(0.10)
Not much studying (less than 30 h)	-0.177^{**}	(0.08)	-0.200^{***}	(0.08)
Many friends			0.076	(0.07)
Good health (stated)			0.723^{***}	(0.10)
Party smoker			-0.190^{**}	(0.10)
Smoker			-0.123	(0.11)
High fashion trend			0.235^{**}	(0.09)
Some fashion trend			0.006	(0.09)
Much alcohol			0.249	(0.15)
Average alcohol			0.117	(0.13)
Much physical exercise			0.130	(0.10)
Average physical exercise			0.085	(0.09)
Much TV			-0.031	(0.08)
No/little TV			0.076	(0.07)
Constant	5.356^{***}	(0.21)	4.477^{***}	(0.25)
Observations	559		559	
R^2	0.12		0.27	

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8.1: OLS regressions, Model 2 (Table 8), with happiness scores as dependent variable for the undergraduate students by gender

	Model 2 All	*Model 2 Female*	*Model 2 Male*
Good exam results (better than average)	0.107	0.234	-0.060
	(0.18)	(0.28)	(0.26)
Average exam results (average)	0.035	0.054	-0.065
	(0.17)	(0.27)	(0.25)
All other variables	YES	YES	YES
Observations	559	328	231
R^2	0.27	0.28	0.32

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8.2: OLS regressions, Model 2 (Table 8), with happiness scores as dependent variable for the undergraduate students by social class

	Model 2 All	*Model 2 High*	*Model 2 Average*	*Model 2 Poor*
Good exam results (better than average)	0.107	0.366	-0.097	0.452
	(0.18)	(0.25)	(0.28)	(0.52)
Average exam results (average)	0.035	0.120	-0.096	0.391
	(0.17)	(0.23)	(0.28)	(0.42)

All other variables	YES	YES	YES	YES
Observations	559	211	285	63
R^2	0.27	0.36	0.25	0.43

Note: Standard errors in parentheses, $^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$. *High* implies good childhood purchasing power, *average* implies average childhood purchasing power, and *poor* implies poor childhood purchasing power.

3.1.3 Individuals' leisure

The undergraduate students' leisure time is different from that of the employed academics in the sense that they have less money to spend on, e.g., leisure activities and clothing but more time to themselves, since fewer students have children and they are single to a higher degree. Table 6 shows that students on average are more concerned with fashion trends than employed academics are ($p_{ttest}=0.0000$).

Table 8 suggests that students with many friends are neither happier nor unhappier. Meanwhile, both Chan et al. (2005) and Mangeloja and Hirvonen (2007) found that students who claim to have developed good relationships with schoolmates during their university time are happier. However, there is a difference between the variables having many friends and forming relationships at a university. For the employed academics, I find that those who have many friends are happier, which is consistent with Argyle (2002).

In addition to spending time with friends, watching TV is also a major leisure activity. Tables 7 and 8 show that employed academics, but not students, who watch TV a lot (on average two hours or more per day) are unhappier. The relationship between TV watching and unhappiness is consistent with, e.g., Frey et al. (2007) and Bruni and Stanca (2006, 2008), who also found that "heavy" TV viewers also have higher material aspiration. They also argue that on average, the negative effect of TV watching on life satisfaction is much higher for people with high opportunity costs of their time. This applies especially to people with flexible working hours, i.e., people who can freely transfer time between work and leisure (such as employed academics and students). One explanation may be that watching TV crowds out interpersonal relationships as argued by Putnam (1995) and Bruni and Stanca (2008). However, as Table 8 shows there are no significant effects of TV-watching for students, perhaps since they to a larger extent watch TV together with friends.

Tables 7 and 8 suggest that neither employed academics' nor students' happiness is correlated with physical exercise. This is inconsistent with, e.g., Dolan et al. (2008), who argue that physical exercise helps promote positive outcomes such as higher levels of happiness.

Tables 7 and 8 show that students who are concerned with fashion (also true for employed academics) and also consume alcohol several times a week (not necessary for employed academics) are happier. These characteristics might be seen as proxies for unmeasured behaviors, such as frequency of party-going.

One notable feature of Tables 7 and 8 is that we can see that party smokers are generally unhappier than both non-smokers and smokers. This result holds for both respondent categories, although it is almost twice as large among employed academics than among students. This finding in some way contradicts Lang et al. (2007), who found that smoking (among people who are older than 50 and live in England) is associated with lower levels of overall life quality. Bancroft (2008) argues that "smoking is used by many to cope with boredom, to manage stress and to deal with some of the frustrations of day-to-day life on a low income." It is not possible to conclude whether party smoking affects happiness or if happiness affects party smoking; it may even be a selection variable. That is, people who have some kind of behavior are more likely to be party smokers.

3.1.4 Individuals' characteristics

Employed academics with relatively better academic performance are not happier than their colleagues. Nonetheless, Table 7 suggests that academic performance in some way does affect happiness; i.e., professors are generally happier than lecturers, *ceteris paribus*. This may be explained by professors having higher status than lecturers. In addition, they have more independent and interesting jobs tasks. For both types of employed academics, higher wages have a positive effect on happiness. There is an inverted u-shaped relation between wage and happiness. The employed academics who earn around 28,000-29,000 SEK per month[11] have the highest average level of happiness, *ceteris paribus*. On the other hand, self-reported wage satisfaction (i.e., an individual thinks his/her wage is fair compared to the wages of permanently employed department colleagues) is not correlated with happiness.

Table 7 further suggests that female employed academics are happier, *ceteris paribus*. This is partly consistent with Ward and Sloane (2001). Several other studies, e.g., Bender and Heywood (2006), Clark (1996, 1997), and Sloane and Williams, (1996, 2000), have found that there also exists a gender difference in job satisfaction.[12] This gender difference (for non-students) might possibly be explained with females having lower expectations regarding where

[11] Model 1 gives 29,100 SEK; model 2 gives 28,200 SEK; model 3 gives 28,700 SEK; and model 4 gives 27,700 SEK.
[12] Although a vast number of studies show substantial and significant positive male-female wage differentials.

they will end up in the labor market. If this is true, it implies that the male-female happiness differential is a transitory phenomenon due to the fact that women tend to do better in the labor market. For example, Sousa-Poza and Sousa-Poza (2003) found that the gender difference in job satisfaction continued to decrease in Great Britain over the period 1991-2000. According to Table 8, there is no male-female happiness differential among the students. This result is consistent with Chan et al. (2005) and Mangeloja and Hirvonen (2007).

The results in Tables 7 and 8 show that both employed academics and students who grew up in families that belonged to relatively high socio-economic groups are significantly happier than those from relatively low socio-economic groups. This may reflect that individuals who grow up in relatively high socio-economic environments tend to maintain a better financial situation as adults.

The respondents who reported to be in good health were also happier than others is a general conclusion in studies on happiness. Additionally, the results in Table 7 support a well-defined U-shaped relationship between age and happiness and imply that the employed academics are unhappiest when they are around 47 years old (model 3 and model 4), *ceteris paribus*. The U-shaped relationship is consistent with, e.g., Oswald (1997) and Blanchflower and Oswald (2004).

One difference between employed academics and students is that students who are single are significantly unhappier than students who are not single, while this is not the case for the employed academics. This is probably due to the fact that singlehood is more often involuntary among students than among employed academics.

3.2 The projected happiness - results

Very few respondents have pessimistic expectations about their future happiness – projected happiness. Only 0.5 percent and 5.3 percent the students and the employed academics, respectively, think they will be unhappier in the future. I therefore merge these respondents with the respondents who think their future happiness level will be the same as the current happiness level into one group. The dependent variable takes the value 0 when the respondents' future expected happiness is either worse than or the same as at present and 1 if the respondents' future expected happiness is higher – thus I run a logistic regression.

As we saw earlier, neither the employed academics' nor students' relative academic performances seem to affect, in either direction, current happiness. However, it is still possible that relative academic performance does affect current happiness, but this result hides behind the exclusion of work intensity for employed academics.

I conjuncture that having higher grades today increases students' future entry incomes/wages (see empirical evidence, e.g., Boero et al., 2001 and Schweri, 2004) and that higher entry incomes/wages are associated with higher future happiness. However, the results, in Table 9, show that those with poor relative academic performance have somewhat higher expectations about future happiness. Students with bad exam results are almost 17 percentage points more likely to think they will be happier in the future than students with good or average exam results do, *ceteris paribus*. A similar pattern is found for employed academics: those with poor relative publication lists have more optimistic expectations about their future happiness than those with good publication lists (here the difference is more than 26 percentage points). A possible explanation is that these individuals think that their academic situation will be relatively better in the future, which will increase their happiness.

For employed academics, it seems that the older the individual, the less likely he/she is to expect himself/herself to be happier in the future.[13] For every additional year of age, employed academics become 1.2 percentage points less likely to expect a happier future, *ceteris paribus*. There seems to be no age effect among the students.

We know from Table 7 that employed academics who watch a lot of TV, consume alcohol 1 time/week to less than 1 time/month (average consumption), and/or are party smokers have lower current happiness. Yet, at the same time, evidence in Table 9 indicates that they also expect that their future happiness will be higher. One explanation may be that watching TV may crowd out, or be a substitute for, other activities that could enhance current happiness. Most of the smokers are aware of the long-run dangers related to smoking. Since they are generally short-sighted, have problems with self-control (Gruber and Mullainathan, 2002), and thus try to optimize their current happiness, they may also lack the positive expectations regarding their future happiness that non-smokers have. My notion is that people with an alcohol consumption of at least 1 time/month live a normal life, while the opposite group live somewhat of an ascetic life.[14]

[13] I have also included a U-shaped relationship between age and future happiness, but both coefficients were insignificant.

[14] Not drinking alcohol may be a result of an alcohol or health related problem or of religious beliefs.

Table 9 also indicates higher future expected happiness among students who state that their health is not good (compared to those with good or very good self-reported health) and among students who grew up in a family with below average purchasing power (compared to those with very much better or somewhat better than average purchasing power). Thus, these students have lower current happiness but believe in a happier future, which may be because they think they will have a future better health conditions.

Table 9: Marginal effects from logistic regressions, where future expected happiness is the dependent variable for the employed academics and the undergraduate students

	Employed Model 1	*Employed Model 2*	*Students Model 3*	*Students Model 4*
Female (d)	-0.0705	-0.0838	0.0384	0.0268
	(0.06)	(0.06)	(0.05)	(0.05)
Single (d)	-0.0106	0.0569	0.0540	0.0581
	(0.09)	(0.09)	(0.05)	(0.05)
Not good health (d)	0.0449	0.0425	0.212***	0.218***
	(0.08)	(0.08)	(0.05)	(0.05)
Not good childhood (d)	0.00326	-0.0101	-0.0990**	-0.116**
	(0.06)	(0.05)	(0.05)	(0.05)
Age	-0.0114***	-0.0120***		
	(0.00)	(0.00)		
Professor (d)	-0.128	-0.175		
	(0.16)	(0.12)		
Average teacher (d)	0.0686	0.0751		
	(0.05)	(0.05)		
Average publication (average) (d)	0.141**	0.122*		
	(0.07)	(0.07)		
Poor publication (worse than avr.) (d)	0.237*	0.262*		
	(0.14)	(0.15)		
ln(wage)	-11.01	-10.59		
	(9.69)	(8.94)		
(ln(wage))^2	0.546	0.533		
	(0.46)	(0.43)		
Relative wage 2	-0.207	-0.466		
	(0.57)	(0.43)		
Not fair wage (d)		-0.000467		
		(0.06)		
Few friends (d)		-0.0272		0.0105
		(0.06)		(0.08)
Party smoker (d)		0.363		-0.0420
		(0.33)		(0.10)
Non-smoker (d)		0.199***		-0.116

		(0.06)		(0.08)
High fashion trend (d)		0.0820		0.0312
		(0.09)		(0.06)
Some fashion trend (d)		-0.0489		-0.00752
		(0.06)		(0.06)
Alcohol consumption (d)		0.198***		-0.0457
		(0.04)		(0.07)
Much physical exercise (d)		0.143		0.0649
		(0.11)		(0.06)
Average physical exercise (d)		0.000973		0.125**
		(0.09)		(0.06)
Much TV (d)		0.269**		0.00819
		(0.13)		(0.05)
Older than 24 years (d)			0.0597	0.0448
			(0.05)	(0.05)
Average exam results (average) (d)			-0.0170	-0.0152
			(0.05)	(0.06)
Poor exam results (worse than avg.) (d)			0.157*	0.169*
			(0.09)	(0.09)
Much studying (more than 40 h) (d)			0.0507	0.0606
			(0.07)	(0.07)
Not much studying (less than 30 h) (d)			0.0370	0.0407
			(0.05)	(0.05)
Observations	245	245	555	555
Pseudo R^2	0.08	0.17	0.04	0.05

Note: Marginal effects are evaluated at the mean value for the continuous variables; standard errors in parentheses; (d) for discrete change of dummy variable from 0 to 1, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4. Conclusions

This paper explores happiness at the university. The results suggest that employed academics at the University of Gothenburg who feel they have above department-average publication lists (or above department-average teaching skills) are not happier than colleagues with worse self-reported publication lists. Work intensity is, unfortunately, an omitted variable, and this may give the coefficients for relative academic performances a downward bias; analogous to Pouwels et al. (2008). In addition, those with average or worse publication lists are more likely to think they will be happier in the future than do colleagues with better publication lists. This may be because they expect improved future academic performance and advancements in both academic position and wages. However, I also find that professors are on average happier than lecturers, *ceteris paribus*, which indicates that academic performance/success, in some way, does matter. This paper's results also indicate that relative wage comparison seems to matter;

hence it is not only absolute income that influences current happiness. Employed academics who earn more than employed faculty colleagues with the same academic position and gender are happier. Furthermore, female employed academics are happier than male employed academics, which is consistent with previous studies, e.g., Bender and Heywood, (2006) and partly Ward and Sloane, (2001). However, although hardly any of the measurable variable distributions differ significantly between the sample and the underlying distribution, it is necessary to keep in mind that the survey of the employed academics has a low response rate (< 30 %), which implies that any statistical inference should be done with the utmost care. Moreover, it is of course impossible to strictly identify any causal relationship based on this type of cross-section data. This means that some of the identified significant parameters may reflect selection effects or even reverse causality.

Not only are students with above average exam results not happier than their classmates with worse exam results, they are also less likely to expect increased happiness in the future. Moreover, no gender-related differences in happiness were found among the undergraduate students, which is also consistent with previous studies, e.g., Chan et al. (2005) and Mangeloja and Hirvonen (2007).

Future research on happiness at universities should include number of work hours. Also, in addition to self-reported relative academic performance, it would be interesting to include objective measures of academic performance such as the quality-adjusted number of peer reviewed journal articles,

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7. Appendix A

Table A1:Difference between the population (employed academics) and the sample survey, p-values for Mean Comparison Test (p_{ttest}) and Wilcoxon-Mann-Whitney test (p_{WMW})

Variable	Diff*	p_{ttest}	p_{WMW}
Age	-0.60	0.3518	0.2525
Gender	-0.01	0.7263	0.7263
Academic position	-0.02	0.4867	0.4865
Wage	-1031	0.0476	0.0808

Relative wage 1	-0.01	0.1975	0.2530
Relative wage 2	-0.01	0.2483	0.3411

Note: * Population (employed academics)-survey sample.

Table A2: Difference between various categories of respondents reported as Mean Comparisonn Test (p_{ttest}) and Wilcoxon-Mann-Whitney test (p_{WMW})

Variable	Category	Respondents	Diff	p_{ttest}	p_{WMW}
Happiness	Employed	Professors-Lecturers	0.15	0.1746	0.2418
		Women-Men	0.18	0.1120	0.1438
	Stud	Women-Men	0.16	0.0277	0.0440
	All	Stud-Employed	0.19	0.0041	0.0007
		Women-Men	0.19	0.0011	0.0015
Future happiness	Employed	Professors-Lecturers	0.13	0.0527	0.0630
		Women-Men	-0.06	0.3810	0.3994
	Stud	Women-Men	0.04	0.3126	0.3937
	All	Stud-Employed	0.37	0.0000	0.0000
		Women-Men	0.08	0.0254	0.0288
Fair wage	Employed	Professors-Lecturers	0.22	0.0107	0.0152
		Women-Men	-0.17	0.0665	0.1260
Publications	Employed	Professors-Lecturers	0.82	0.0000	0.0000
		Women-Men	0.09	0.4191	0.2122
Teaching	Employed	Professors-Lecturers	-0.02	0.8189	0.8807
		Women-Men	0.08	0.2346	0.2357
Exam	Students	Women-Men	0.18	0.0002	0.0001
Hours	Students	Women-Men	-0.21	0.0501	0.1125
Age	Employed	Professors-Lecturers	-3.70	0.0010	0.0046

Table A3: Ordered probit regression with happiness scores as dependent variable for the employed academics

	Model 1		Model 2		Model 3		Model 4	
Happiness								
Professor	0.849**	(0.38)	0.930**	(0.37)	1.008**	(0.42)	1.113***	(0.39)
Female	0.400***	(0.15)	0.422***	(0.16)	0.317*	(0.17)	0.343**	(0.17)
Age	-0.280***	(0.08)	-0.282***	(0.08)	-0.292***	(0.10)	-0.295***	(0.10)
Age square	0.003***	(0.00)	0.003***	(0.00)	0.003***	(0.00)	0.003***	(0.00)
Single	-0.287	(0.20)	-0.309	(0.20)	-0.203	(0.20)	-0.230	(0.20)
Good health (stated)	0.776***	(0.17)	0.788***	(0.17)	0.804***	(0.18)	0.820***	(0.18)
Average childhood (in purchasing power)	0.274	(0.20)	0.285	(0.20)	0.372*	(0.21)	0.387*	(0.21)
Good childhood (in purchasing power)	0.355	(0.22)	0.357*	(0.22)	0.457**	(0.22)	0.461**	(0.22)
Good teacher (better than average)	0.175	(0.16)	0.179	(0.16)	0.187	(0.16)	0.192	(0.16)
Good publication (better than average)	0.006	(0.28)	0.011	(0.28)	-0.137	(0.29)	-0.131	(0.29)
Average publication (average)	0.027	(0.27)	0.027	(0.27)	-0.034	(0.27)	-0.033	(0.27)
ln(wage)	61.812*	(32.93)	64.157**	(31.41)	69.857**	(29.28)	72.433**	(28.39)
(ln(wage))^2	-3.005*	(1.57)	-3.129**	(1.49)	-3.399**	(1.39)	-3.537***	(1.35)
Relative wage 1	2.030	(1.33)			2.236	(1.37)		
Relative wage 2			2.281*	(1.26)			2.575**	(1.24)
Many friends					0.312*	(0.18)	0.299*	(0.18)

Party smoker					-0.814***	(0.22)	-0.812***	(0.22)
Smoker					0.120	(0.28)	0.137	(0.27)
High fashion trend					0.399	(0.24)	0.400*	(0.24)
Some fashion trend					0.365**	(0.18)	0.375**	(0.18)
Much alcohol					-0.334	(0.32)	-0.343	(0.32)
Average alcohol					-0.597*	(0.30)	-0.603**	(0.31)
Much physical exercise					-0.097	(0.24)	-0.105	(0.24)
Average physical exercise					0.009	(0.21)	-0.002	(0.21)
Much TV					-0.798***	(0.30)	-0.818***	(0.30)
No/little TV					0.146	(0.15)	0.145	(0.15)
More than fair wage (stated)					-0.256	(0.41)	-0.259	(0.41)
Fair wage (stated)					0.082	(0.18)	0.071	(0.18)
cut1								
Constant	311.976*	(172.94)	323.223*	(165.18)	352.532**	(154.62)	364.696**	(150.06)
cut2								
Constant	313.053*	(172.94)	324.304**	(165.17)	353.727**	(154.62)	365.896**	(150.07)
cut3								
Constant	314.658*	(172.94)	325.912**	(165.17)	355.440**	(154.62)	367.612**	(150.06)
cut4								
Constant	315.988*	(172.92)	327.242**	(165.15)	356.859**	(154.59)	369.032**	(150.04)
Observations	247		247		247		247	
Pseudo R^2	0.08		0.08		0.13		0.13	

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A4: Ordered probit regression with happiness scores as dependent variable for the undergraduate students

Students	*Model 1*		*Model 2*	
Female	0.144	(0.11)	0.156	(0.12)
Older than 24 years	-0.415***	(0.11)	-0.269**	(0.12)
Single	-0.566***	(0.10)	-0.619***	(0.10)
Good health (stated)	1.144***	(0.14)	1.058***	(0.15)
Average childhood (in purchasing power)	0.119	(0.16)	0.071	(0.17)
Good childhood (in purchasing power)	0.458***	(0.17)	0.319*	(0.18)
Good exam results (better than average)	0.164	(0.26)	0.184	(0.27)
Average exam results (average)	0.046	(0.25)	0.042	(0.26)
Much studying (more than 40 h)	-0.384***	(0.14)	-0.385***	(0.15)
Not much studying (less than 30 h)	-0.312***	(0.11)	-0.311***	(0.11)
Many friends			0.116	(0.11)
Party smoker			-0.288**	(0.14)
Smoker			-0.181	(0.16)
High fashion trend			0.343**	(0.14)
Some fashion trend			-0.014	(0.14)
Much alcohol			0.327	(0.22)
Average alcohol			0.122	(0.18)
Much physical exercise			0.212	(0.14)
Average physical exercise			0.120	(0.14)
Much TV			-0.013	(0.12)
No/little TV			0.129	(0.11)
cut1				
Constant	-1.395***	(0.32)	-1.134***	(0.36)
cut2				
Constant	-0.548*	(0.32)	-0.255	(0.36)
cut3				
Constant	1.088***	(0.33)	1.439***	(0.37)
cut4				
Constant	2.697***	(0.35)	3.092***	(0.40)
Observations	559		559	
Pseudo R^2	0.11		0.13	

Note: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Paper 4

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The lambda model and "rule of thumb" consumers: An estimation problem in existing studies

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ABSTRACT

Campbell and Mankiw's (1990) lambda model has frequently been used to estimate the fraction of rule of thumb consumers (i.e., consumers who do not smooth their consumption). However, the present note shows theoretically, as well as with a numerical illustration, that existing empirical applications of the lambda model imply a systematic underestimation of this fraction. The reason is that per capita values instead of aggregate values (which the model is designed for) are used.

1. Introduction

Aggregation of the consumption behavior of individuals links the consumption of individuals and the aggregate consumption in an economy. A large proportion of the Gross Domestic Product (GDP) of an economy is made up of consumption, and the behavior of per capita consumption has therefore always been a topic on the research agenda.

Hall's (1978) permanent income hypothesis (PIH) with rational expectations opened up a window for empirical research in consumption theory. However, empirical evidence shows that the PIH is not consistent with consumption data, since some consumers do not smooth their consumption over time as the PIH argues (Shea, 1995). Instead they consume their entire incomes—a rule of thumb behavior. This rule of thumb (put in another way "hand-to-mouth") behavior is subject to several possible interpretations: (i) consumers are liquidity constrained, (ii) consumers are extremely myopic, or (iii) they use a heuristic decision rule. Evidence from disaggregate data supports the liquidity constraint interpretation, i.e., they cannot borrow money (Zeldes, 1989). Meanwhile, findings in behavioral economics support the interpretations that consumers are myopic, or they use a heuristic decision rule. For example, in the narrow framing theory, consumers tend to care too much about their labor income and too little about their wealth (permanent income) when making consumption choices (see, e.g., Cox and Sadiraj, 2008; Barberis et al., 2006; Holt and Laury, 2002; Johansson-Stenman, 2010). Moreover, other consumers tend to use a kind of heuristic rules in cognitive demanding decision situations (see, e.g., Gilovich et al., 2002; Cochrane, 1989). Hence, consumers end up consuming a fraction, or all, of their income instead of their calculated optimal fraction of their permanent income.

To estimate the size of the fraction of consumers who do not smooth their consumption, Campbell and Mankiw (1990) developed the lambda model, where λ is the fraction of consumers who do not consume their permanent income, i.e., their annuity value of their expected lifetime resources, but instead consume their current income in each period.[1]

This note shows theoretically, as well as with a numerical illustration, that using per capita values to estimate the fraction of consumers who are current income consumers systematically results in underestimations. This is because the lambda model is designed for aggregate values and not for per capita values. Furthermore, when the assumption of stable proportions (over time) of consumers who do smooth and who do not smooth their con-

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[1] See Weber (2002, p. 295) for previous papers that have used the lambda model and for the sizes of the λ coefficient.

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sumption is abandoned, the per capita consumption function in first difference is complex.

This note has the following structure: in Section 2, we present Campbell and Mankiw's (1990) lambda model, and given that we know the true fractions of current income consumers and permanent income consumers, we then derive a function for the change in per capita consumption. Thereafter, we revisit the lambda model and illustrate the fact that earlier empirical papers have systematically underestimated the fraction of current income consumers. The next step is that we abandon the assumption of fixed proportions of these two types of consumers and allow some current income consumers to become permanent income consumers, and show what effect this has on the function for the per capita consumption change. In Section 3, we draw some concluding remarks.

2. Individuals and their aggregated consumption

2.1. The lambda model

There are several reasons why the PIH is inconsistent with consumption data, e.g., consumers are liquidity constrained and tend to follow a heuristic decision rule in cognitively demanding decision situations. Moreover, some consumers are even narrow framed, since they do not consider their wealth when making consumption decisions. Hence, some consumers are therefore not able to smooth their consumption over time and they instead consume their current income—rule of thumb consumers.[2] We follow Campbell and Mankiw (1991, p. 728), who write aggregate consumption (C_t) as:

$$C_t = \lambda Y_t + (1-\lambda)Y_t, \tag{1}$$

where they argue that current income consumers accrue fraction λ of current aggregate income (Y_t). This implies that permanent income consumers accrue a $1-\lambda$ fraction of current aggregate income (Y_t). Moreover, Campbell and Mankiw (1990, p. 266) presume that the permanent income consumers consume their permanent income ($C_t^p = Y_t^p$). By the argument of Hall (1978), we know that the only thing that changes their consumption is income innovations ($\Delta C_t^p = \varepsilon_t$), where ε_t is the innovation between periods $t-1$ and t in consumer expectations of permanent income (Y_t^p). Hence, Campbell and Mankiw (1990) write the change in aggregate consumption in period t as:

$$\Delta C_t = \lambda\,\Delta Y_t + (1-\lambda)\varepsilon_t. \tag{2}$$

This is also called the lambda model since the model is used to estimate the fraction of consumers who do not smooth their consumption.

Nonetheless, when authors estimate the fraction of consumers who are liquidity constrained, they use per capita values of consumption and income (see, e.g., Campbell and Mankiw, 1990, 1991; Agell and Berg, 1996; Chyi and Huang, 1997) instead of aggregate measures of consumption and income for which the model is designed. If we rewrite (2) as per capita, then consumption changes ($\Delta\bar{c}_t^{biased}$). That is, if we divide (2) by the number of consumers, then the per capita consumption in first difference is:

$$\Delta\bar{c}_t^{biased} = \lambda\,\Delta\bar{y}_t + (1-\lambda)\bar{\varepsilon}_t. \tag{3}$$

Now λ represents a fraction of per capita income change ($\Delta\bar{y}_t$).

2.2. Two types of consumers in the economy

Consider an economy with two types of consumers. Both types have rational expectations and their utility depends only on their absolute consumption: (i) permanent income consumers (M individuals), who implement a perfect consumption-smoothing plan given by the PIH, and who change their consumption plans in period t only as a result of income innovations (ε_t), which are unpredictable in period $t-1$,[3] and (ii) current income consumers (N individuals), who spend every dollar of their current income—a rule of thumb consumption behavior. We know from Eq. (2) that λ represents the true fraction of aggregate income that comes from current income consumers. This implies that N individuals in the economy do not consume their permanent income. These two types of consumers change their consumption in period t as:

$$\Delta c_t^{rot} = \Delta y_t^{rot}; \quad \text{for fraction} \quad \frac{N}{N+M} \equiv \lambda, \tag{4}$$

and

$$\Delta c_t^{p} = \varepsilon_t^{p}; \quad \text{for fraction} \quad \frac{M}{N+M} \equiv 1-\lambda. \tag{5}$$

We know that M individuals are permanent income consumers and N individuals are current income consumers. Hence, the aggregate consumption change in period t is:

$$\Delta C_t = N\,\Delta y_t^{rot} + M\varepsilon_t^{p}. \tag{6}$$

Since per capita values are commonly used when estimating the model, we need to divide both sides of Eq. (6) by the number of consumers ($N+M$). Then, current per capita consumption change is:

$$\Delta\bar{c}_t^{unbiased} \equiv \Delta\frac{C_t}{N+M} = \frac{N}{N+M}\,\Delta y_t^{rot} + \frac{M}{N+M}\varepsilon_t^{p}. \tag{7}$$

Using the knowledge that $\lambda = N/(N+M)$ and $(1-\lambda) = M/(N+M)$, we can rewrite Eq. (7) as[4]:

$$\Delta\bar{c}_t^{unbiased} = \lambda\,\Delta y_t^{rot} + (1-\lambda)\varepsilon_t^{p}. \tag{8}$$

Evidently, per capita consumption change in period t depends on: (i) the proportions of current income and permanent income consumers in the economy, (ii) the income change of the current income consumers, and (iii) the income innovations of the permanent income consumers.

2.3. Revisiting the lambda model

The estimate of λ in Eq. (3) is consequently not correct since λ represents the fraction of per capita income change and not the income change for the fraction of consumers who do not consume their permanent income. It is not possible to reconcile these two equations since: (i) the change in per capita income $\Delta\bar{y}_t$ in Eq. (3) is not equal to the change in per capita income of the current income consumers Δy_t^{rot} in Eq. (8), and (ii) the income innovations of the permanent income consumers differ from per capita income innovations. This can easily be studied if we subtract Eq. (3) from Eq. (8):

$$\Delta\bar{c}_t^{unbiased} - \Delta\bar{c}_t^{biased} = \lambda(\Delta y_t^{rot} - \Delta\bar{y}_t) + (1-\lambda)(\varepsilon_t^{p} - \bar{\varepsilon}_t). \tag{9}$$

[2] We disregard the fact that *current income consumers* may choose to consume less than their current earnings and therefore enjoy consumption growth in the future; i.e., *current income consumers* do not save.

[3] This ε_t is to be considered as the revision of the expected future stream of labor income, and since we assumed homogeneity within the group, we consider this revision to be equal for all individuals. The properties of ε_t are dependent on the labor income process, which is usually assumed to be a white noise process, i.e., $\varepsilon_t \sim N(0, \sigma^2)$.

[4] We can also see that in Eq. (8), the independent variables are not dependent on each other as in Eq. (3).

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Table 1
Changes (in first differences) in Swedish wages (SEK) in various percentiles.

Annual changes	P10	P20	P30	P40	P50	P60	Per capita ($\Delta\bar{y}_t$)
Δy_{93}	−423.0	−429.0	−394.0	−379.0	−349.0	−375.0	−322.0
Δy_{94}	252.0	272.0	322.0	368.0	378.0	424.0	490.0
Δy_{95}	21.0	48.0	33.0	−17.0	−96.0	−118.0	−93.0
Δy_{96}	565.0	586.0	670.0	758.0	913.0	981.0	1022.0
Δy_{97}	410.0	519.0	569.0	576.0	621.0	668.0	719.0
Δy_{98}	245.0	351.0	351.0	442.0	477.0	556.0	716.0
Δy_{99}	206.0	349.0	399.0	467.0	493.0	510.0	604.0
Δy_{00}	439.0	376.0	438.0	455.0	531.0	675.0	767.0
Δy_{01}	209.0	239.0	264.0	312.0	378.0	308.0	458.0
Δy_{02}	228.0	262.0	288.0	318.0	321.0	447.0	335.0
Δy_{03}	265.0	285.0	304.0	310.0	304.0	344.0	327.0
Δy_{04}	396.0	508.0	568.0	622.0	613.0	636.0	684.0

However, only if $\Delta y_t^{rot} = \Delta\bar{y}_t$ and $\varepsilon_t^p = \bar{\varepsilon}_t$ would we be able to reconcile these two equations and also use per capita values to estimate λ. We argue that this would be a highly unlikely situation for all countries. For example, if we study 1992–2004 wage data of Swedish individuals, we can see (Table 1) that annual income changes (lowest percentiles P10–P60) differ from per capita income changes in all years.[5]

The Swedish data reveals a general tendency: when there is a positive per capita change, the changes in the higher percentiles are greater. We do not know exactly in which income percentile the rule of thumb consumers are (the cut-point between current income and permanent income consumers), but as we can see in Table 1, $\Delta y_t^{rot} < \Delta\bar{y}_t$ holds for all years. When there exists a skewness in the distribution of per capita income changes, which is valid for all countries, we will end up with this inequality result. Furthermore, $\varepsilon_t^p > \bar{\varepsilon}_t$ always holds since $\bar{\varepsilon}_t = \varepsilon_t/(N+M)$. However, we assume that the above inequalities are always true, i.e., that $\Delta y_t^{rot} < \Delta\bar{y}_t$ and $\varepsilon_t^p > \bar{\varepsilon}_t$. Then it is easy to see that the λ is smaller in Eq. (3) than in Eq. (8). Hence, the lambda model systematically underestimates the fraction of current income consumers when per capita values are used instead of aggregate values. This result ought to be valid not only for Sweden but for all other countries as well.

2.3.1. *Current income consumers become permanent income consumers*

Some consumers move up (and down) the income percentiles over their lifetimes. If we then relax the assumption of stable proportions of current income consumers and permanent income consumers, and assume that some current income consumers become permanent income consumers, then we have to derive a new expression for the per capita consumption change. Assume that a fraction of consumers were current income consumers in period $t-1$ but become permanent income consumers ($c^{rot} \to c^p$) in period t (assume that the current income consumers have no financial wealth, since they were unable to borrow in period $t-1$). Then these consumers change their consumption as:

$$\Delta c_t^{rot\to p} = \frac{r}{1+r}\left(\sum_{k=0}^{\infty}(1+r)^{-k}E_t y_{t+k}^p\right) - y_{t-1}^{rot}. \tag{10}$$

Permanent income consumers still change their consumption as in Eq. (5), and current income consumers change their consumption as in Eq. (4). In period $t-1$, the proportions of current income consumers and permanent income consumers are λ_{t-1} and $1-\lambda_{t-1}$, respectively, but in period t a fraction τ_t of the current income consumers become permanent income consumers. The new proportion of current income consumers is therefore $\lambda_{t-1}-\tau_t$, of "old" permanent income consumers $1-(\lambda_{t-1})$, and of "new" permanent income consumers τ_t. The per capita consumption change becomes:

$$\Delta\bar{c}_t = (\lambda_{t-1}-\tau_t)\,\Delta y_t^{rot} + (1-\lambda_{t-1})\varepsilon_t^p + \tau_t\left(\frac{r}{1+r}\left(\sum_{k=0}^{\infty}(1+r)^{-k}E_t y_{t+k}^p\right) - y_{t-1}^{rot}\right). \tag{11}$$

If all consumers have income processes that follow random walks with a drift μ (different drifts for current income and permanent income consumers), then the consumer income in period t is $y_t^{rot,p} = (1+\mu_{rot,p}+\omega_t)y_{t-1}^{rot,p}$, where μ and ω are expressed in percentages. Rewriting Eq. (11), we then have:

$$\Delta\bar{c}_t = (\lambda_{t-1}-\tau_t)\Delta y_t^{rot} + (1-\lambda_{t-1})\varepsilon_t^p + \tau_t\left[\frac{r(\mu_{rot}+\omega_t)+\mu_p}{r-\mu_p} - 1\right] y_{t-1}^{rot}. \tag{12}$$

Comparing Eq. (12) with Eq. (8), we can see that the function of per capita consumption in first difference is much more complex. When the economic activity in countries grows over time, it may imply that a lower fraction of consumers are following the rule of thumb. Thus, the fraction of rule of thumb consumers is more complicated to estimate than Campbell and Mankiw (1990) argue.

3. Concluding remarks

We have shown that the lambda model, frequently used in the past (e.g., in Campbell and Mankiw, 1990, 1991; Agell and Berg, 1996; Chyi and Huang, 1997; and in contemporary macroeconomic textbooks such as Romer, 2004) to estimate the fraction of consumers who do not smooth their consumption, systematically underestimates the fraction of λ. This is due to the fact that the data these papers use are per capita values and not aggregate values, which the model is designed for. Given that the proportions of current income consumers and permanent income consumers are stable over time, we show that per capita consumption depends on the income changes of current income consumers, in addition to the income innovations of permanent income consumers. If the proportions are not stable over time, then the function of per capita consumption change becomes more complex and the fraction of λ is thus even harder to estimate.

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[5] The data comes from LINDA, which is a register-based data set (Longitudinal Individual Data for Sweden) containing the wages of 3% of the population. All the wages are in 2004 prices.

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Paper 5

Sick listing – partly a family phenomenon? [1]

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Johan Wall[4]

Abstract

Being sick listed is not always identical to being ill; it is rather a behaviour associated with illness. In this paper we have analysed whether there is a higher risk of becoming sick listed if a family member has been sick listed earlier – partly a family phenomenon. This aspect of sick listing has never been investigated before. Our results indicate that an individual's risk of being sick listed in 2007 was higher if he/she had family members who had been sick listed in 2006. This may be a sign for an existing "sick listing culture" – social norms within families.

Keywords: sick listing, social norms, family members, family phenomenon
JEL classification: D12, J22

1. Introduction

Due to payments of sick leave benefits, loss in productivity, the cost of finding temporary staff and loss of labour income, absence is indeed a costly phenomenon for society, firms and the individual people. These high costs alone motivate continuous efforts to better understand the causes and determinants of absence from work.

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An early attempt to conceptualize the individual absence decision process was made by Steers and Rhodes (1978). In their seminal paper worker's attendance decision depends on the individual's *ability* as well as his/her *motivation* to go to work. What factors are important to the individual ability and motivation and how these variables affect the individual work attendance, in turn, depend on personal characteristics, such as age, gender, and tenure. Today there exists a large strand of literature exploring the potential relationships between absence and a wide range of personal characteristics (e.g., gender (Bekker et al., 2009), educational level (Lund et al., 2007), marital status (Nilsson, 2006)), as well as different working conditions (e.g. physical environment) (Ose, 2005, Trinkoff et al., 2001), organizational structure (Marklund et al., 2007), absence culture (Xie and Johns, 2000, Drago and Wooden, 1992), demographic composition (Mastekaasa, 2005), human relations and quality of management (Niedhammer et al., 2008) and sickness insurance system (Henrekson and Persson, 2004).

Hence we know that individuals' work and working environment are among the most important factors behind the extent of individual ill-health. Earlier research results show that variations in sick listings cannot be explained for example by differences in demography, structures of industries or systems of rules. In recent years the role and importance of social interactions with respect to absence have received increased attention from scientists and policymakers alike. Individual absence decisions are more and more acknowledged to be highly influenced by the behavior and beliefs of others. Social considerations are believed to be taken into account whenever the decision of being absent from work is taken. The Swedish Social Insurance Agency[5] (SSIA) SKA project shows among other things that persons' ill-health depends partly on their life situations, and partly on their attitudes towards being sick listed. Hansen (2006, p. 111) shows results that indicate that "it is very clear that the Swedish people – as far as the respondents may be considered to be representative – have a considerably more liberal attitude towards using the health insurance than the official representatives of SSIA". The SKA project points out that individuals have attitudes that indicate a potential over-exploitation of the health insurance system. Similar results are reported by Modig and Broberg (2002). Hesselius (2007) has found evidence in Swedish data that when men retire, the lengths of their wives' sick listings increase. The effects of social

[5] Försäkringskassan.

networks may be that persons are bound to tradition and partly influenced by behaviours in the social network – social norms – which influence the individual to partly act according to the social norms of the network[6]. This means that persons' self experienced health and illness are partly influenced by normative behaviour in the social networks (see for example Brown, 1995).

Earlier results thus indicate that sick listings may be influenced by other people's sick listings. For example, Lindbeck et al. (2007) find evidence of the impact of social norms both within residential areas and at the workplaces. Ichino and Maggi (2000) support the idea of the impact of social norms at the workplace level. Bokenblom and Ekblad (2007) also find evidence of the impact of the workgroups' social norms. Meanwhile Hesselius (2008, 2009) find also that workers' own sickness and effort are affected by the proportion of colleagues that are absent because of sickness. The purpose of this study is to analyse whether there is a higher risk of becoming sick listed if a family member has been sick listed earlier. As far as we know, no one has investigated this question before.

This paper has the following structure: section 2 describes the hypotheses we wish to test. In section 3, we present the methodology. In section 4 we discuss the data we use, and in section 5 we present the empirical evidences. Finally, in section 6, we draw some conclusions.

2. Social network and their norms

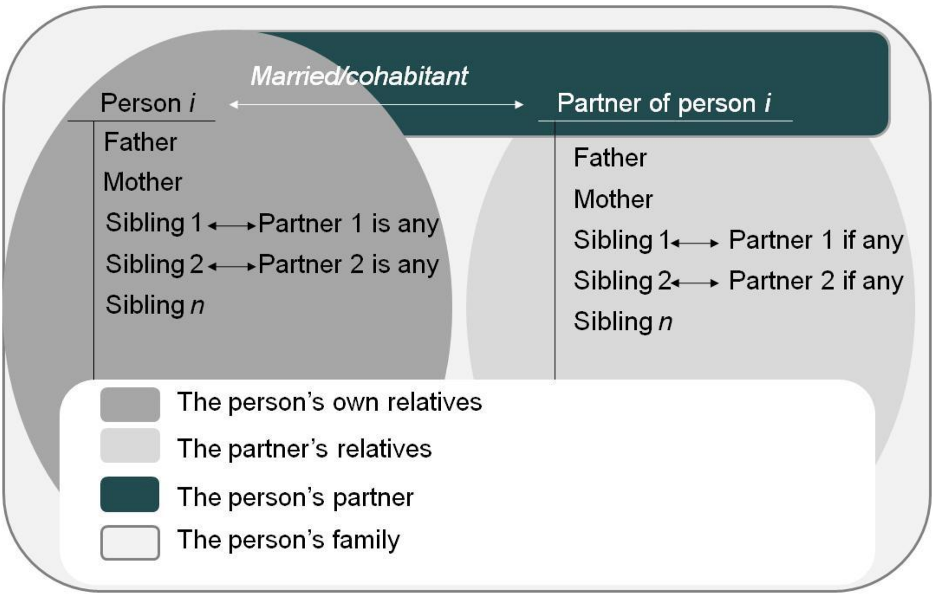
Hansen (2006) argues that there is a clear contradiction between some persons' attitudes towards being sick listed than SSIA's official guidelines for sick listing. If we assume that those attitudes are reflected in their behaviour, it may lead to an acceptance of being sick listed in spite of no reduction in the ability to work – as in Johns and Nicholson (1982) and Chadwick-Jones et al. (1982) an absence culture theory. These persons may also be parts of social networks, where they, consciously or unconsciously, convey their attitudes about the use of the health insurance system. If, in addition, there are social norms within those networks which support the more liberal attitude towards the health insurance system, it may

[6] The collective norms are of course found in several groups, for example in the family, at the work place, and in society as a whole.

lead to a certain "sick listing culture". If a family member has been sick listed in period *t-1*, it may marginally lead to a person becoming sick listed in period *t*.

In this study the individuals' social network is defined as the "close" relatives (parents, siblings and their partners if any), the individual's partner[7], the partner's parents, siblings and their partners if any. We have chosen not to include the individuals' children if any, since our hypothesis is that attitudes – social norms – towards being sick listed spread downwards through the generations, i.e. from parents to children but not upwards. From now on we refer to the whole group as the individual's family.[8]

Figure 1: Overview of the definitions of a person's families and relatives



Sjögren and Kristenson (2000) argue that blue collar workers' networks are dominated by family members and relatives, whereas white collar workers' networks to a greater extent include individuals with a similar profession or social background. A drawback of a network

[7] Partners are defined as married or cohabitants. Cohabitants must have children together in order to be included.
[8] There is no information in the data about the quality of the relation to close friends or colleagues. It would, however, be possible to find colleagues in the data registers.

consisting of family members and relatives is that it is much more difficult to repair in the case of resettlement or loss of persons in the network. Durkheim (Moe, 1995) argues, however, that there is no society where everyone agrees about norms and valuations and furthermore follows the system of rules of that society. Merton (1957) argues that persons who are exposed to "relative deprivation"[9] may develop a behaviour that deviates from the society's norms. The problem is brought to a head when deviations are redefined, so that many of the behaviours that were originally stigmatised are no longer considered to be abnormal, i.e. an abnormal behaviour becomes normative within the social networks.

2.1 Hypotheses

In this paper we want to analyse whether the risk of persons becoming sick listed was higher in period *t* if any of their family members were sick listed in period *t-1*. We separate the influence of social norms into three components: (*i*) an impact via the person's partner, (*ii*) an impact via the person's own relatives, and (*iii*) an impact via the partner's relatives. The basic idea is that the person's partner has the greatest impact and the person's own relatives have higher impact than the partner's relatives on his/her sick listing. If we find empirical support for our hypothesis, it would indicate that people tend to follow a normative behaviour present in the family. The division of the family into three groups has not only been made to analyse possible differences in social impacts from the persons' own families and the partners' families. Through the division of the person's family into his/her own relatives and the partner's relatives, a possibility is created to show if there is a genetic connection which influences the sick listings in period *t* if any.

3. Methodology

3.1 The dependent variable – sick listed or not

The dependent variable is dichotomous and states whether a person has been sick listed or not in period *t*. If a person has more than 0 days with payments in the form of sickness benefit, preventive sickness benefit, work injury payment and/or rehabilitation payment, we consider the person to have been sick listed that year. This means that part-time sick listed persons are also recorded as sick listed. However, those who have been sick listed only the first 14 days (including the one day qualifying period), when the employer pays the sickness benefit, are

[9] How individuals evaluate their living conditions depending on whom they compare with.

not recorded as sick listed. From day 2 until day 14 the employer pays the sickness benefit and from day 15 the person is paid from SSIA. The remuneration is 80 percent of the income with an upper limit of 7.5 basic amounts. In 2007 the remuneration was 80 percent reduced by a factor 0.989 to 79.12 percent. In order to become sick listed, a person must show a medical doctor's certificate, which must then be approved by SSIA.

3.1.1 Population

When creating the population for analysis, we limit the population with those who were employed[10] according to the register based labour market statistics (RAMS)[11], which amounts to 4.4 million persons. Since employees and self employed are subject to different sick listing rules, we only record the employees. The population has been further limited to persons who had a partner, who in turn had siblings or parents all in the age group 20 – 64 years and not full time pensioners (see Figure 1).

This means that we will not be able to make statements about singles or persons with a partner without siblings. Those persons might of course have a different "sick listing culture" than the persons in our population. Hemström (1996) mentions research that suggests a selection of people entering into matrimony, which implies that people with less than good health tend to be overrepresented among the unmarried. Therefore we cannot make deductions about all employees. Our population amounts to less than one million persons, which corresponds to a little more than one fifth of all those who were employed in 2007.

3.2 The effect of social interaction

We assume that there is a normative behaviour among persons' family members. Behaviours are imitated partly because other people in the family have imitated family members' behaviour in the same situation before. We must know for certain that person *i* 's sick listing could depend on family members' normative behaviour. One way of handling the problem is to use historical sick listing data for the persons' families in period *t-1* when studying their sick listings in period *t*.

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[10] The person must not be a registered owner of an enterprise and simultaneously an employee in another firm (in the analysis of 2007).

[11] For more information, see www.scb.se/rams .

A problem in the analysis of interaction effects is that person *i*'s behaviour in periods *t-2* may affect the group's behaviour in period *t-1*. Manski (1993) calls this "the reflection problem", since it reminds us of the question whether the mirror's reflection rules the viewer's movements or if it reflects the viewer's actions. In order to reduce the effects of a person's influence on the family members' behaviour, which in turn affects the person's behaviour, we disregard the persons who have been sick listed in periods *t-1* and *t-2.* Thus, the population consists only of persons who became sick listed for the first time during a three year period. By this procedure we minimise the persons' impacts on their families' behaviour in period *t-1*. We have also estimated all models without this constraint; the results were similar to those shown in the paper.

The "sick listing culture" found in the persons' social networks (the reference group) is complicated to measure. In the economic literature incorporation of the social interplay in models for economic decision making is a relatively new phenomenon. Since neither social interactions nor social norms are traditional economic variables, their importance has been overlooked by economists (Sen, 2004). In recent years, however, the strand of both theoretical and empirical literature combining economic decisions, social interactions and social norms has increased substantially.[12] Absence has traditionally been regarded as the outcome of a daily decision between labor and leisure. The decision is based on a comparison between the utility of attending work and the utility of non-work activities. Absence is thus a mean for the employee to adjust his/her labor supply in response to imperfect market conditions and individual preferences. If, for example, the contracted working hours are greater than what is desired by the individual, there exist incentives to be absent from work (Allen, 1981). Early economic models only regard monetary values when modeling absence. Typically, wages and non-work income are included in the models. In later labor supply models, non-monetary factors, e.g., health status (Barmby et al., 1994), working conditions (Ose, 2005) and norms (Lindbeck and Persson, 2008), have been included in the model. Non-monetary factors are assumed to affect the absence decision through their impact on either the employee's utility of working or the utility of not attending work.

[12] See Manski (2000), Dietz (2002), Soetevent (2006) for reviews.

By extending the individual's utility function also to include social concerns economist have been able to show/demonstrate the importance of social norms for economic outcomes. For example, Lindbeck and Persson (2008) incorporate social norms in a theoretical model regarding individual absence behaviour in the presence of income insurance. In their model they assume that the social norm is to work rather than living of benefits. Individuals acting in a way that does not conform to the norm, i.e., being absent and living of benefits are being stigmatized. The discomfort felt by the individual living of benefits is higher (lower) when the proportion of people upholding the norm is higher (lower). Hence, individuals make their decisions about working or not taking the behaviour of other individuals into consideration. Even thought it is theoretical appealing to implement the notion of social interactions in economic models, it is a rather challenging task to estimate the effect empirically (Manski, 2000). The reference group's social norms – behaviour – are called social interaction effects. The social interaction effect must, however, be separated from a possible surrounding effect, i.e. people imitating certain behaviour because they are in a particular geographical place. We also need to separate the social interaction effect from a selection (sorting) effect, meaning that persons imitate the reference group's behaviour because they share the same characteristics. Both these effects must be considered in order to find a pure social interaction effect. Only then can we draw conclusions about sick listing being a family phenomenon, i.e. governed by the family's social norms. Typical surrounding effects are the place of residence and the workplace, while selection effects emanate from factors such as sex, age, education and country of birth. In our analyses we therefore control for surrounding effects and selection effects.

The advantage of using the members of a persons' family as a reference group is that they are exogenous to the persons investigated. If we had chosen to analyse how sick listings within residential areas or workplaces influence peoples risk of becoming sick listed, we would have met the problem that people themselves choose where to live and where to work according to their preferences. This might reflect that all persons in a residential area have the same socio-economic background and values. It is impossible, however, to choose one's family, both relatives and one's partner's relatives (although it is possible to avoid having contact with them).

3.2.1 The selection problem

The partner a person chooses to live with, on the contrary, is the result of an active choice according to preferences. A selection (sorting) problem arises in the cases when the partner's interests, values, attitudes and life style coincide with those of the person analysed. All, or a majority of the family might then belong to the same socio-economic group, have the same occupation, educational background, life style and/or interests. This is because both the person analysed and his/her partner have received their interests, values, attitudes and life styles from their childhood, families and partners and friends. Hence, they may share all these characteristics with their relatives. This implies that we risk catching a selection effect in our hypotheses variables instead of the impact of social interaction within the family on the sick listing behaviour, i.e. health and sick listings are correlated within some families. In order to control for this selection effect, one must use a proxy variable for sick listings in the family that is exogenous to the person's own sick listing, i.e. the proxy variable for sick listing in the family should be stochastic. To our knowledge we do not have any variables (confounders) in our data that possess this feature. Using register data, we may look at the educational level and occupational group (which are often used as proxies for socio-economic classification) for each person in relation to their families to get an indication of the existence of a selection effect (see the sensitivity analysis below).

The impact of the family members' earlier sick listings on a person's risk of becoming sick listed could be a result of a selection (sorting) effect. This means that it exists only within certain socio-economic groups or families with a certain life style and that this effect drives the results. From this approach, we try to analyse whether there is a selection effect. Socio-economic groups are usually created from occupation and education. From the classification we know if the persons are blue collar or white collar workers and what educational level they hold.

In the first step we compute the share of white collar workers in the persons' families (the partner, the person's own family and the partner's family). If the share of white collar workers exceeds 50 percent, the family is classified to be a white collar family. The occupation is a function of the education. The higher a person's education, the stronger the probability that he/she gets a white collar occupation. We compute the families' average education levels and group them in the following categories: (*i*) compulsory (pre-secondary) education, (*ii*) secondary education and (*iii*) post-secondary education.

4. Data

In order to create a micro dataset we have used data from four different registers at Statistics Sweden: (*i)* the longitudinal integrated database for analysis of health insurance and labour market (LISA), (*ii*) the register-based labour market statistics (RAMS), (*iii*) the total population register (RTB), and (*iv*) the multigenerational register (Flergen). These registers cover all persons registered in Sweden on 31 December each year.

4.1 Descriptive statistics

The population consists of 893 531 persons in 2007. We could not match 56 582 persons to any workplace and therefore we dropped these observations. Table 1 shows that the sick listing numbers follow the official statistics from SSIA and Statistics Sweden well. The share of sick listed persons in 2007 was 6.8 percent. There were approximately twice as many women as men sick listed. The distribution over sexes was relatively even. Highly educated people were sick listed to a lesser extent than those with low levels of education, and the share of sick listed was lower in the private sector than in the municipalities and the county councils. The average age was about 44 years and did not differ much between the sexes.

In 2007, 40.3 percent of those who had been sick listed had had at least one family member who had been sick listed in 2006. When analysing the group of those not sick listed, we find that only 36.0 percent in 2007 had had a family member who was sick listed the year before. This discrepancy may indicate an influence of social norms from the persons' own relatives. There is a similar difference among persons who had been sick listed and had family members on the partner's side or partners' who were sick listed the year before.

Table 1: Descriptive statistics of the populations of 2007. Percent (with some exceptions)

Variable	**Mean**	**Std.**
Women	47.3	-
Average age*	43.3	9.5
Average age women*	42.9	9,4
Average age men *	43.7	9,7

Number of average family member	8.5	3.1
Sick listed	6.7	-
women	9.0	-
men	4.6	-
pre-secondary education	8.2	-
secondary education	7.2	-
post-secondary education	5.7	-
in municipality	8.9	-
in county council	8.0	-
in government	5.6	-
in private	6.0	-
country of birth Sweden	6.7	-
country of birth not Sweden	7.7	-
with small children (0-6 years)	7.2	-
not with small children (0-6 years)	6.4	-
Sick listed at period *t* with sick listed partner at period *t-1*	13.6	-
Not sick listed at period *t* with sick listed partner at period *t-1*	12.5	-
Sick listed at period *t* with sick listed own relatives at period *t-1*	40.3	-
Not sick listed at period *t* with sick listed own relatives at period *t-1*	36.0	-
Sick listed at period *t* with sick listed partners' relatives at period *t-1*	39.5	-
Not sick listed at period *t* with sick listed partners' relatives at period *t-1*	37.3	-
Number of persons	893 531	

Note: * in year and where *t*=2007 and *t-1*=2006.

5. Empirical results

Overall we use a standard logistic regressions technique when we estimate the models' parameters with robust standard errors in STATA. Table 2 presents results from the basic regressions (model 1). We already know that the working environment has a great impact on the risk of becoming sick listed and therefore choose to keep the working environment of the workplaces constant. We use the share of sick listed persons in each workplace the year before the year of analysis as a proxy variable for the working environment[13]. In model 3 we try to control for selection (sorting) problems that arise from the fact the person *i* may have similar behaviour than their family members because they all have the same socio-economic background. Model 3 is then our benchmark model. In Table 3 we separate short sick listings from long sick listings (the limit being 90 days). The same distinction is made for family members.

5.1 Signs of a sick listing culture

[13] The person himself/herself is excluded in both the numerator and the denominator if sick listed.

Model 1 in Table 2 shows that there is a higher risk of becoming sick listed if some family members are sick listed in period *t-1*. In other words, if at least one family member between 20 and 64 years of age was sick listed in period *t-1* there was in fact a higher risk for a person to be sick listed in period *t*. When we in model 2 hold the persons' characteristics constant we can see that the impact from their own and their partner's relatives' sick listing decreases while the impact from the partner's sick listing increases. Hence, some of the independent variables are confounding variables. Adding further information about the partner, the person's own family's and the partner's family's education levels and whether they are classified as white collar workers or not (model 3). The risk of becoming sick listed in 2007 was about 23 percent higher if a person's partner had been sick listed in 2006. There was also an impact, although weaker, from the individual's own and his/her partner's relatives. A person had about 13 percent higher risk of becoming sick listed in 2007 if at least one member of his/her own relatives had been sick listed in 2006. If someone among the individual's partner's relatives would have been sick listed, the risk would have been 5 percent. Since we observe an increased risk of being sick listed if a family member of the partners' relatives was sick listed in 2006, this points in the direction that the families' social norms matter to some degree.

The coefficients, in Table 2, for the variables of impact via a family's earlier sick listing are relatively similar between the models 2 and 3. Therefore we conclude that there are no direct indications of any selection (sorting) effects that we can catch via register data. However, we find clear indications that the "better" the socio-economic background a person's family has, the lower is his/her risk of the person becoming sick listed. Hence, the empirical results indicate signs of a "sick listing culture" within some families, independent of socio-economic status.

It is only a marginal effect on sick listing, but it is economically meaningfulness to stress that sick listing is effected to some degree by social norms. [14] One should also bear in mind that an unsound life style will of course increase the risk of becoming sick listed. Therefore, the

[14] The results of table 2 are similar for the result of 2002. It can be noted that the risk of becoming sick listed (both via the person's own family and via the partner's family) was lower in 2007 than in 2002. Upon request to the corresponding author, it is possible to receive estimation results for 2002.

results may to some extent be driven from the fact that choosing a partner with an unsound life style may lead to ill health. A similar life style might also be found in the partner's family; this may be the case that results are driven by a sorting effect on life styles.

According to our results the most important factor behind sick listing is the working environment, measured by the share of sick listed persons at the workplace in period *t-1*. This corresponds well with findings in other studies, e.g., Haugen et al. (2006).

The regression coefficients also indicate that people in their 40s have the lowest risk of becoming sick listed and that men have a lower risk of becoming sick listed than women. A notable result is that men who have small children (0 – 6 years) have a significantly lower risk of becoming sick listed. It is the diametrically opposite result for women. Women with small children have a 3.56 times higher odds of becoming sick listed than men with small children. This is probably a result from a selection effect. One explanation may be that those women who work and at the same time and have "the main" responsibility for small children run a higher risk of becoming sick listed. Persons with an upper secondary education or higher ran a lower risk of becoming sick listed than those with a shorter education. People born in Sweden generally ran a lower risk of becoming sick listed than others. The risk of becoming sick listed was higher for people who worked in the municipal sector than in other sectors.

Table 2: Results of regressions where a person is sick listed in 2007

	Model 1		Model 2		Model 3	
Impact via partner 2006	0.083***	(0.01)	0.22***	(0.01)	0.21***	(0.01)
Impact via own relatives 2006	0.17***	(0.01)	0.12***	(0.01)	0.12***	(0.01)
Impact via partner's relatives 2006	0.089***	(0.01)	0.054***	(0.01)	0.046***	(0.01)
Age			-0.12***	(0.00)	-0.12***	(0.00)
Age square			0.0015***	(0.00)	0.0014***	(0.00)
Women			0.55***	(0.01)	0.52***	(0.01)
Country of birth Sweden			-0.12***	(0.03)	-0.098***	(0.03)
Small children (0-6 year)			-0.19***	(0.02)	-0.19***	(0.02)
Women* Small children			0.71***	(0.02)	0.72***	(0.02)
Post-secondary school			-0.36***	(0.02)	-0.29***	(0.02)
Secondary school			-0.12***	(0.01)	-0.094***	(0.01)
White collar			-0.42***	(0.01)	-0.40***	(0.01)
Private sector			-0.26***	(0.01)	-0.25***	(0.01)
County council sector			-0.041**	(0.02)	-0.031*	(0.02)
Government sector			-0.21***	(0.02)	-0.19***	(0.02)
More than 5 family members			-0.0045	(0.02)	-0.0071	(0.02)
Share of sick listed WP 2006			1.14***	(0.06)	1.10***	(0.06)
Partner white collar					-0.048***	(0.01)

Partner secondary school					-0.0050	(0.01)
Partner post-secondary school					-0.048^{***}	(0.02)
Person's own relative white collar					-0.035^{***}	(0.01)
Person's own relative secondary school					-0.074^{***}	(0.01)
Person's own relative post-secondary school					-0.12^{***}	(0.02)
Partner's relative white collar					-0.025^{**}	(0.01)
Partner's relative secondary school					-0.046^{***}	(0.01)
Partner's relative post-secondary school					-0.066^{***}	(0.02)
Constant	-2.75^{***}	(0.01)	0.18^{**}	(0.09)	0.18^{**}	(0.09)
Control for residential counties	No		Yes		Yes	
Observations	893 531		893 531		893 531	
Pseudo R^2	0.00		0.04		0.04	

Coefficients; *standard errors* in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5.2 Short and long sick listings – different impacts?

SSIA classifies sick listings into those longer than 90 days and those 90 days or shorter. The SSIA calls these long and short sick listings respectively. We have used the same classification for a person's sick listing and for his/her family members' sick listings, if any[15]. Therefore we have performed three different regressions; the results are presented in Table 3. The first regression includes all sick listed persons no matter their sick listing length. The second and third regressions concern those with short and long sick listings respectively.

It is clear that both the persons' own families, the partners' and partners' relatives long sick listings have a stronger impact on persons' long sick listings than on their short sick listings. Part of the explanation of the increase in the impact of persons' own families' long sick listings from 10 to 27 percent (from short to long sick listings) might be the genetic heritage from the persons' own relatives. Another explanation might be that the life style within some families influences the persons' health negatively. The results show an even higher increase in odds ratio for impact via partners' previous sick listing (from 12 to 39 percent).
The person's own relatives' short sick listings, on the contrary, influence the persons' risk of becoming sick listed less (10 percent higher) than their long sick listing (27 percent higher). The impact via the person's partner and the person's partner's relative short sick listing on the person's long sick listing is no longer statistically significant. Hence, family's long sick listing have a positive impact on the person's long sick listing.

[15] We have summed together the persons' gross number of days with sick listing. If the sum exceeds 90 days, it is classified as long term sick listed. We have disregarded the fact that there might be more than one sick listing period. About 20 percent of the persons with long sick listings have more than one sick listing period the same year. The corresponding number for short sick listings is about 12 percent.

It is worth pointing out that men with small children ran a lower risk of becoming sick listed for a long period. This is the strongest effect in not becoming sick listed for a long period. This drop in the odds ratio may to some degree be explained by economic incentive. Men most often earn more. If men would become sick listed for long periods it will have a much higher negative impact on the household economy, than if women would have become sick listed for long periods – *ceteris paribus*.

Table 3: Results of regressions where a person is sick listed (SL) in 2007

	SL		Short SL		Long SL	
Age	-0.12^{***}	(0.00)	-0.12^{***}	(0.00)	-0.078^{***}	(0.01)
Age square	0.0014^{***}	(0.00)	0.0014^{***}	(0.00)	0.0011^{***}	(0.00)
Women	0.53^{***}	(0.01)	0.51^{***}	(0.01)	0.52^{***}	(0.03)
Country of birth Sweden	-0.097^{***}	(0.03)	-0.088^{***}	(0.03)	-0.13^{**}	(0.06)
Small child (0-6 year)	-0.19^{***}	(0.02)	-0.15^{***}	(0.02)	-0.42^{***}	(0.04)
Women* Small child	0.72^{***}	(0.02)	0.71^{***}	(0.02)	0.70^{***}	(0.05)
Post-secondary school	-0.28^{***}	(0.02)	-0.27^{***}	(0.02)	-0.30^{***}	(0.04)
Secondary school	-0.093^{***}	(0.01)	-0.085^{***}	(0.02)	-0.11^{***}	(0.03)
White collar	-0.40^{***}	(0.01)	-0.42^{***}	(0.01)	-0.29^{***}	(0.03)
Private sector	-0.25^{***}	(0.01)	-0.26^{***}	(0.01)	-0.17^{***}	(0.03)
County council sector	-0.031^{*}	(0.02)	-0.042^{**}	(0.02)	0.030	(0.04)
Government sector	-0.19^{***}	(0.02)	-0.18^{***}	(0.02)	-0.23^{***}	(0.05)
More than 5 family members	-0.0082	(0.02)	-0.00090	(0.02)	-0.038	(0.04)
Share of sick listed WP 2006	1.10^{***}	(0.06)	1.02^{***}	(0.06)	1.31^{***}	(0.13)
Impact via partner short	0.19^{***}	(0.02)	0.21^{***}	(0.02)	0.11^{***}	(0.04)
Impact via partner long	0.23^{***}	(0.02)	0.20^{***}	(0.02)	0.33^{***}	(0.05)
Impact via own relatives short	0.064^{***}	(0.01)	0.056^{***}	(0.01)	0.096^{***}	(0.02)
Impact via own relatives long	0.14^{***}	(0.01)	0.12^{***}	(0.01)	0.24^{***}	(0.03)
Impact via partner's relatives short	0.037^{***}	(0.01)	0.036^{***}	(0.01)	0.038	(0.02)
Impact via partner's relatives long	0.040^{***}	(0.01)	0.032^{***}	(0.01)	0.071^{***}	(0.03)
Constant	0.19^{**}	(0.09)	0.058	(0.10)	-2.76^{***}	(0.24)
Control for residential council	Yes		Yes		Yes	
Control for sorting effect	Yes		Yes		Yes	
Observations	893531		893531		893531	
Pseudo R^2	0.04		0.03		0.03	

Coefficients; *standard errors* in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6. Conclusions

A “sick listing culture” may exist within families. We have presented results that indicate that family members’ earlier sick listings affect people’s risk of becoming sick listed. The impact was stronger from members of the persons’ own relatives than from relatives on the partner’s side. The reasons might be a genetic heritage and/or the fact that behaviour and values to a great extent are formed during people's adolescence, when contacts with their own relatives are more important than those with the partner's relatives.

The genetic heritage might influence the sick listing history within one's own relatives. But since we have also found a statistically significant connection between persons' sick listings and those of their partners' relatives, there is reason to believe that the social interaction within their own families will also influence the risk of becoming sick listed. A different interpretation of the results is that people tend to choose partners with similar behaviours, for example with respect to an unsound life style, which in turn might cause sick listings. The selection (sorting) problem is difficult to solve with register data. We are aware that some of our results might be due to selection problems, but we have found no indications in the data that suggest that our results are driven by selection bias. We therefore conclude that there are signs of sick listings being partly influenced by the social interactions within families.

A notable family phenomenon is how small children affect their parents' probability of being sick listed. The results show us that men are less likely to be sick listed if they have small children (0-6 years) than men that do not have small children. It is diametrically the opposite for women. If they have small children they have a much higher probability of being sick listed than women without small children. Hence, small children seem to be a health indicator – a selection effect – for men.

Further quantitative analysis could probably contribute to the knowledge about the importance of sick listing within the family. One interesting question is whether the risk of becoming sick listed increases with the number of family members that have been sick listed in the previous period. There is also a need for further analysis of the importance of the length of the sick listing spells among family members.

It is crucial to remember that sick listing is decided by a medical doctor and must be approved by SSIA. It would therefore be interesting to include the medical diagnoses behind the sick listings in the analysis.

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