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Direct Evidence for Income Comparisons and Subjective Well-Being across Reference Groups

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ABSTRACT

Direct Evidence for Income Comparisons and Subjective Well-Being across Reference Groups[*]

This note provides evidence for the relationship between income comparisons and subjective well-being (SWB), using novel German data on self-reported comparison intensity and perceived relative income for seven reference groups. We find negative correlations between comparison intensity and SWB for colleagues, people in the same occupation and friends, but not for other reference groups, such as neighbours. Work-related income comparisons are mostly upwards and there is a strong negative correlation between perceiving to earn less than the reference group and SWB.

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1. Introduction

Empirical studies investigating the impact of relative income on subjective well-being (SWB) face fundamental problems. This is because it is generally not known (1) how important income comparisons are for individuals, (2) how people assess different reference groups and (3) what they perceive their relative income to be. Researchers often ignore the first problem, define reference groups in terms of observable criteria, such as age, and identify relative income themselves. There are few data sets that enable researchers to partially solve these problems. Clark/Senik (2010), for example, employ a measure of general income comparison intensity and know about the direction of comparison. Clark et al. (2015) have similar information with regard to comparison intensity and the most important reference category and, additionally, can use evidence on perceived income of one proposed reference group.[1]

In this note, we address all three aspects because, in our data, employees report how important they regard income comparisons to be with respect to various proposed reference groups from the work and the private domain, and what they believe their income is, relative to that of each of them. Having such information allows us to analyse whether the relationship between income comparisons and SWB differs across reference groups from different domains.

2. Data, Empirical Specifications and Descriptive Evidence

Our analysis is based on three pretest modules of the German Socio-Economic Panel (SOEP). SOEP pretests are self-contained, annual representative random samples of the resident population in Germany.[2] They contain direct information on the intensity of income comparisons and perceived relative income for different reference groups for the years 2008-2010. In 2010, employed respondents were asked: "*When you think about your gross labour income compared to that of other individuals: How important is it to you how your gross income compares to that of: (a) your neighbours, (b) your friends, (c) your colleagues at the workplace, (d) other people in your occupation, (e) people of your age, (f) your parents when they were your age, (g) your partner, (h) other women or (i) other men*". Respondents were requested to state the intensity of income comparisons on a seven-point scale for every reference group, ranging from "*completely unimportant (1)*" to "*extremely important (7)*". A second question relating to the same nine reference groups followed directly afterwards: "*And how high is your gross income in comparison to the following people: …*" Respondents were offered a five-point scale, ranging from "*much lower (1)*" to "*much higher (5)*". Since the

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[1] See also, for example, Knight et al. (2009), de la Garza et al. (2012), and Oshio/Urakawa (2014).
[2] For information about the SOEP see Wagner et al. (2007) and for details on SOEP pretests, see http://www.diw.de/en/diw_01.c.389728.en/soep_survey_papers.html. Mayraz et al. (2010) analyse the 2008 pretest.

wording of the gender-specific questions was altered over time, we only use information on the other seven reference groups in our empirical analysis.

Responses to the standard life satisfaction question, *"How satisfied are you with your life, all things considered?"*, ranging from 0 *"completely dissatisfied"* to 10 *"completely satisfied"*, are used to measure subjective well-being (SWB). The pretests furthermore contain a small subset of those questions regularly asked in the SOEP questionnaires.

Because the SOEP pretests constitute independent cross-sections, we pool these data from 2008 to 2010. We focus on employed respondents aged 17 to 65 years because the questions relating to income comparisons are partly restricted to this this group and, for example, the enquiry relating to colleagues implicitly requires such limitation.

Our model of subjective well-being of individual *i* is specified as follows:

$$SWB_i = \alpha + ic\_imp_{ij} * \beta + less\_inc_{ij} * \delta_1 + more\_inc_{ij} * \delta_2 + \ln(y_i) * \tau + x_i * \theta + \varepsilon_i, \quad (1)$$

where ic_imp_{ij} is a dummy variable indicating that income comparisons are important (*values 5 to 7*) with respect to reference group *j*, and $less\_inc_{ij}$ and $more\_inc_{ij}$ are set equal to 1 if income is perceived to be lower (*values 1 and 2*) or higher (*values 4 and 5*) than the income of reference group *j*. y_i is net monthly household income, the only household-specific income measure consistently available in the three pretests, and ε_i is an idiosyncratic error term. The vector of further covariates x_i and descriptive statistics are documented in Table A1. Below we present OLS-estimates of equation (1), since ordered probit coefficients and estimates based on ordinal measures of the income comparison variables are very similar.

Descriptive Evidence

Figure 1 shows the distributions of the intensity of income comparisons and perceived relative income. Focussing on work-related reference groups, 30%-40% of respondents regard comparisons as essential (*values 5 to 7*), and roughly two-thirds of them perceive to earn about the same (*value 3*) than colleagues or other people in the respondent's occupation, while about a quarter perceives to earn less (*value 1 and 2*). Hence, individuals define the intervals they use to compare income rather broadly in Germany, as is the case in other countries (Knight 2009, Guven/Sørensen 2012). Turning to the various reference groups from the private domain (*friends, neighbours, people from the same age group, parents, partner*), only 5% to 20% of employees regard income comparisons as essential. Figure 1 further indicates that roughly one-third of respondents perceive to earn about the same, more, or less than the respective reference group from the private domain.

Figure 1: Income Comparisons and Perceived Relative Income

Source:SOEP, pretests 2008-2010.
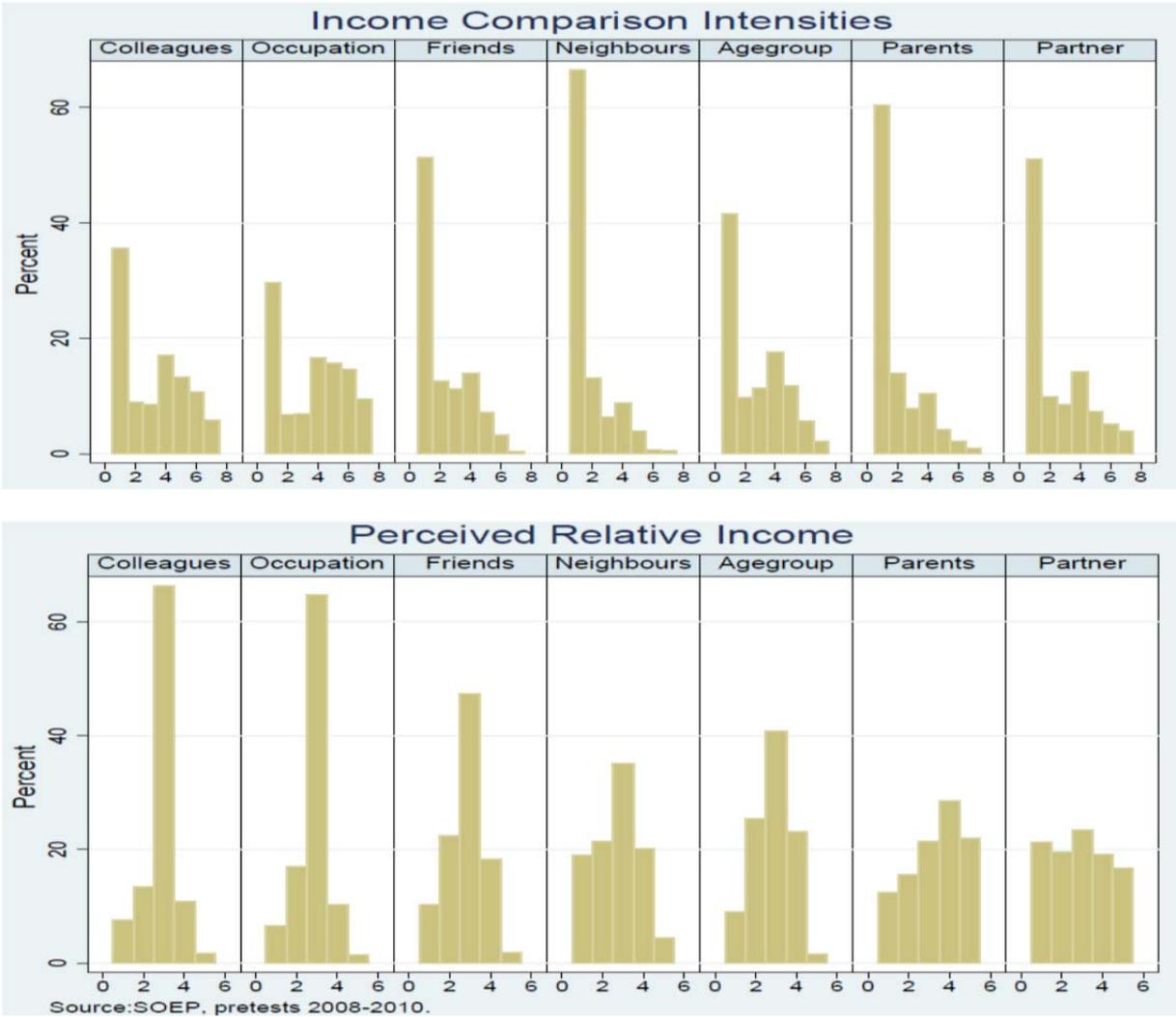
Given the observed distributions of income comparison intensities across reference groups, it might be of interest to know to which reference group people compare most intensively to. Therefore, we create a panel data set by stacking the different individual responses regarding comparison intensities one above the other. Regressing income comparison intensity on dummies of the seven reference groups as well as all other covariates of equation (1) produces the following conditional ranking of average income comparison intensities across reference groups: (1) *people from your occupation*, (2) *colleagues*, (3) *same age group*, (4) *partner*, (5) *friends*, (6) *parents* and (7) *neighbours*. Hence, on average, income comparisons are more intensive when people relate themselves to people from the work domain. Note, however, that when comparing the highest values attached to the intensity of income comparisons across the two domains, no unambiguous ranking is feasible for 51% of the respondents, while in 32% (17%) of the cases respondents compare income most intensively for a reference group from the work (private) domain. These figures indicate that relative income concerns are

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multidimensional and that it is important to carefully differentiate analyses and implications with regard to alternative reference groups.

3.   Regression Results

Basic Findings

Initially, various specifications of equation (1) were estimated for each of the seven proposed reference groups. We observed systematic correlations between the comparison variables and SWB for *colleagues*, *people in your occupation* and *friends* only.[3] Hence, we look at these three reference groups in more detail below. Additionally, we relate SWB to the unweighted individual averages of the comparison intensity and the relative income position across all reference groups. Finally, we create a sample in which we use information from the reference group which respondents categorise as the most important in terms of comparison intensity.[4] Table 1 reports the estimated coefficients for all comparison variables and net income.[5]

Table 1: Subjective Well-Being and Income Comparisons

Reference Group	*Colleagues*	*People in your occupation*	*Friends*	*Average across all reference groups*	*Most important*
Column	1	2	3	4	5
ic_imp_{ij}	-0.373**	-0.282**	-0.484**	-0.303*	-0.323**
	(0.112)	(0.100)	(0.162)	(0.136)	(0.100)
$less\_inc_{ij}$	-0.298*	-0.367**	0.010	-0.378*	-0.374**
	(0.133)	(0.122)	(0.121)	(0.163)	(0.125)
$more\_inc_{ij}$	0.066	0.088	0.283*	0.236	-0.019
	(0.147)	(0.150)	(0.129)	(0.180)	(0.148)
$\ln(y_i)$	0.608**	0.573**	0.566**	0.548**	0.588**
	(0.109)	(0.107)	(0.113)	(0.109)	(0.106)
N	868	894	845	931	897
R^2	0.15	0.15	0.15	0.14	0.15

Source: SOEP pretest modules 2008-2010. OLS-estimates. Dependent variable: SWB. For additional controls see Table A2. Robust standard errors in parentheses. Significance levels: ** (0.01), * (0.05).

Individuals who classify income comparisons as important (ic_imp_{ij}) exhibit a level of SWB that is lower by 0.3-0.5 points on the 0-10 scale. Furthermore, the effect of perceiving to earn less than a work-related reference group ($less\_inc_{ij}$) is roughly equivalent to a one-standard-deviation of (log) net household income. Both results underline the importance of perceptions with respect to relative income in the work domain. However, comparison effects are

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[3] Results for the other reference groups are available from the authors upon request.

[4] If respondents report identical intensities across groups, information for "*people in your occupation*" is used.

[5] Full results are found in the Appendix, Table A2, and are available upon request for all other specifications. Findings for other covariates are in line with previous studies (see, f. e., Ferrer-i-Carbonell 2005).

asymmetric: there is no correlation for employees who perceive to earn more ($more\_inc_{ij}$). This also holds true for the composite reference groups (col. 4 & 5). Interestingly, we observe asymmetric comparison effects with respect to *friends*, which are opposite to those for the work domain, while the impact of comparison intensity is similar (cf. col. 3). These diverging results again indicate the importance of considering reference groups from different domains.

In order to compare the strength of the relationship between SWB and relative income concerns from different domains, we calculate average individual comparison intensities (*ic_imp*) and average individual relative income positions (*less_inc*; *more_inc*) for the work domain (*colleagues*, *occupation*) and the private domain (the other five reference groups). When we estimate a modified equation (1) in which these six average measures are included, we only find significant negative coefficients for the work-related comparison intensity measure and the dummy variable indicating that respondents perceive to earn less than their peers in the work domain (*results not documented*). Hence, income comparisons in the work domain tend to affect SWB more strongly than comparisons in the private domain.

Robustness Checks

Equation (1) assumes that the intensity of income comparisons and the perception of relative income affect SWB separately. However, one might conjecture that the more intensively someone compares to others the stronger is the effect of perceived relative income on SWB. To check this hypothesis, we additionally include interaction terms of ic_imp_{ij} and $less\_inc_{ij}$ and $more\_inc_{ij}$ in extended versions of equation (1). Since the estimated parameters of the interaction terms are never significantly different from zero (*results not documented*), the intensity of comparison per se is related to SWB.

Our pooled cross-sectional data does not allow us to control for unobserved heterogeneity by means of fixed effects specifications. However, personality traits are a notable part of unobserved individual heterogeneity and correlated with income comparisons (Cobb-Clark/ Schurer 2012, Buunk/Gibbons 2007). The SOEP pretests provide information on personality traits by means of the Big Five Inventory (BFI). Hence, we include standardised personality scores for openness, conscientiousness, extraversion, agreeableness and neuroticism and their interactions with relative income ($less\_inc_{ij}$, $more\_inc_{ij}$) in an extension of equation (1). Table 2 indicates that our main results are unaffected, with one significant exception: We no longer observe a significant correlation between perceived relative income and SWB for the reference group of *friends*. This is notable since people can affect the composition of the reference group *friends* most easily and, therefore, our result might point to the endogeneity

of specific reference group formations. Furthermore, we can observe significantly positive (negative) correlations between conscientiousness and extroversion (neuroticism) and SWB, while the coefficients of the interaction terms of perceived relative income and the five personality score are not significant in virtually all cases (*not documented* in Table 2).

Table 2: Incorporating Information on Personality Traits

Reference Group	*Colleagues*	*People in your occupation*	*Friends*	*Average across all reference groups*	*Most important*
ic_imp_{ij}	-0.370**	-0.275**	-0.348*	-0.131	-0.282**
	(0.105)	(0.094)	(0.153)	(0.130)	(0.095)
$less\_inc_{ij}$	-0.206+	-0.213+	0.053	-0.334*	-0.235*
	(0.123)	(0.118)	(0.123)	(0.157)	(0.120)
$more\_inc_{ji}$	0.007	0.105	0.180	0.113	-0.021
	(0.141)	(0.141)	(0.123)	(0.172)	(0.142)
$\ln(y_i)$	0.611**	0.587**	0.585**	0.558**	0.593**
	(0.104)	(0.104)	(0.110)	(0.106)	(0.104)
Openness	0.080	0.078	0.094	0.090+	0.076
	(0.055)	(0.055)	(0.059)	(0.055)	(0.055)
Conscientiousness	0.121*	0.131*	0.088	0.113*	0.131*
	(0.055)	(0.052)	(0.054)	(0.052)	(0.052)
Extraversion	0.151**	0.153**	0.162**	0.160**	0.160**
	(0.054)	(0.054)	(0.056)	(0.053)	(0.054)
Agreeableness	0.105+	0.119*	0.126*	0.108+	0.113+
	(0.060)	(0.059)	(0.063)	(0.060)	(0.059)
Neuroticism	-0.384**	-0.364**	-0.354**	-0.351**	-0.356**
	(0.057)	(0.060)	(0.062)	(0.059)	(0.060)
N	855	881	833	916	883
R^2	0.27	0.26	0.26	0.25	0.26

Notes: See Table 1 for further details. Significance levels: ** (0.01), * (0.05), + (0.1).

As a final robustness check, we analyse whether our empirical approach affects findings. Since the OLS-specifications employed thus far impose constant marginal effects, we also estimate a parametric rating scale model which allows the marginal effects to vary (cf. Studer/Winkelmann 2011). Reassuringly, the estimated average marginal effects are very similar to the OLS-estimates shown in Table 1 (*not documented*).

Subgroup Analyses

The relationship between SWB and relative income may differ across subgroups. While Akay/Martinsson (2012) and Clark/Senik (2010), for example, do not observe gender differences, Guven/Sørensen (2010) and Mayraz et al. (2010) find stronger effects for men. Hence, we look separately at men and women. Moreover, we consider the argument that the effect of relative income on SWB varies with age and split our sample by age (45 years). Table 3 documents the findings for all five specifications also included in Tables 1 and 2.

Table 3: Subgroups

Reference Group	Colleagues	People in your occupation	Friends	Average across all reference groups	Most important	Colleagues	People in your occupation	Friends	Average across all reference groups	Most important
					Gender					
			Male					Female		
ic_imp_{ij}	-0.268+	-0.262+	-0.538**	-0.258	-0.238+	-0.484**	-0.305*	-0.366	-0.320	-0.415**
	(0.161)	(0.144)	(0.201)	(0.176)	(0.144)	(0.157)	(0.139)	(0.274)	(0.207)	(0.138)
$less\_inc_{ij}$	-0.164	-0.195	0.134	-0.315	-0.358+	-0.449*	-0.540**	-0.030	-0.392+	-0.403*
	(0.192)	(0.180)	(0.176)	(0.264)	(0.189)	(0.178)	(0.162)	(0.163)	(0.202)	(0.166)
$more\_inc_{ij}$	0.139	0.101	0.271	0.107	-0.165	-0.107	0.118	0.285	0.697+	0.137
	(0.178)	(0.191)	(0.167)	(0.205)	(0.183)	(0.259)	(0.262)	(0.216)	(0.402)	(0.257)
$\ln(y_i)$	0.617**	0.625**	0.643**	0.604**	0.631**	0.589**	0.498**	0.484*	0.480**	0.525**
	(0.129)	(0.132)	(0.134)	(0.133)	(0.131)	(0.184)	(0.177)	(0.193)	(0.180)	(0.178)
R^2	0.18	0.17	0.17	0.16	0.17	0.19	0.17	0.17	0.15	0.17
N	422	426	414	443	433	446	468	431	489	464
					Age groups					
			<= 45					> 45		
ic_imp_{ij}	-0.333*	-0.204	-0.262	-0.142	-0.247+	-0.426*	-0.365*	-0.921**	-0.527*	-0.428**
	(0.137)	(0.127)	(0.192)	(0.163)	(0.129)	(0.192)	(0.162)	(0.278)	(0.233)	(0.157)
$less\_inc_{ij}$	-0.261+	-0.285+	0.039	-0.350	-0.384*	-0.470+	-0.545**	-0.045	-0.502*	-0.376+
	(0.158)	(0.157)	(0.163)	(0.217)	(0.160)	(0.246)	(0.203)	(0.175)	(0.251)	(0.209)
$more\_inc_{ij}$	0.144	0.141	0.196	0.295	0.014	-0.016	-0.012	0.584**	0.171	-0.053
	(0.217)	(0.214)	(0.179)	(0.267)	(0.215)	(0.204)	(0.222)	(0.190)	(0.269)	(0.206)
$\ln(y_i)$	0.561**	0.571**	0.608**	0.555**	0.562**	0.703**	0.589**	0.506**	0.544**	0.661**
	(0.136)	(0.138)	(0.146)	(0.139)	(0.135)	(0.177)	(0.169)	(0.166)	(0.175)	(0.171)
R^2	0.14	0.13	0.14	0.13	0.13	0.20	0.20	0.23	0.19	0.20
N	507	519	498	540	520	361	375	347	392	377

Notes: See Table 1. Significance levels: ** (0.01), * (0.05), + (0.1).

The direction of the relationship between relative income and SWB is the same for men and women. However, one may tentatively conclude from the upper part of Table 3 that the intensity of income comparisons and perceiving to have less income than members of proposed reference groups from the work domain are particularly important for women. The lower part of Table 3, furthermore, indicates that the observed correlations are somewhat stronger for older individuals (see also Akay/Martinsson 2012, FitzRoy et al. 2014).

The relationship between relative income concerns and SWB may also differ between people who care about social comparison and those who do not. Therefore, as a final subgroup analysis we consider only those respondents who state that income comparisons are not completely unimportant ($ic\_impt_{ij} > 1$). The estimated parameters are similar to those shown in Table 1 (*not documented*) and asymmetric income comparison effects can be observed for work-related reference groups.

4. Summary

This note demonstrates the distinct importance of income comparison intensity and perceived relative income for SWB. With respect to work-related reference groups, such as *colleagues* and *people in the same occupation*, we find that (a) income comparison intensity and SWB are negatively correlated, (b) income comparisons are mostly upwards, (c) perceiving to earn less than the reference group is negatively correlated with SWB, and (d) comparison intensity and perceived relative income do not interact. By the same token, the perceived income of members of reference groups from the private domain does not affect SWB in Germany, with the possible exception of the reference group *friends*. These findings are basically robust and can in most cases also be obtained when including additional control variables, such as indicators of personality traits, or looking at various subgroups. Finally, note that our data does not allow us to consider the potential endogeneity of the income comparison measures. However, since we compare differences across reference groups, this feature of the data might be less relevant for our study, but underlines the need for more detailed information on income comparison measures from different domains.

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Appendix

Table A1: Descriptive statistics of covariates

Variables	Mean	Std. Dev.	N
Net household income (ln)	7.684	0.586	975
Male	0.471	0.499	1211
Age (*in years*)	42.406	11.841	1211
Apprenticeship	0.651	0.477	1211
University	0.199	0.399	1211
Part-time	0.244	0.430	1211
Firm size: $5 \leq x < 20$ employees	0.192	0.394	1211
Firm size: $20 \leq x < 200$ employees	0.292	0.455	1211
Firm size: $200 \leq x < 2000$ employees	0.150	0.358	1211
Firm size: ≥ 2000 employees	0.174	0.379	1211
Public sector	0.239	0.427	1211
Married	0.577	0.494	1211
Children in the household	0.321	0.467	1211
White-collar worker	0.570	0.495	1211
Self-employed	0.104	0.305	1211
Pretest09	0.348	0.476	1211
Pretest10	0.279	0.449	1211

Source: SOEP pretest modules 2008-2010. Weighted statistics.

Table A2: Complete results: Subjective Well-Being and Income Comparisons

Reference Group	Colleagues	People in your occupation	Friends	Average across all reference groups	Most important
ic_imp_{ij}	-0.373**	-0.282**	-0.484**	-0.303*	-0.323**
	(0.112)	(0.100)	(0.162)	(0.136)	(0.100)
$less\_inc_{ij}$	-0.298*	-0.367**	0.010	-0.378*	-0.374**
	(0.133)	(0.122)	(0.121)	(0.163)	(0.125)
$more\_inc_{ij}$	0.066	0.088	0.283*	0.236	-0.019
	(0.147)	(0.150)	(0.129)	(0.180)	(0.148)
$\ln(y_i)$	0.608**	0.573**	0.566**	0.548**	0.588**
	(0.109)	(0.107)	(0.113)	(0.109)	(0.106)
Male	-0.135	-0.165	-0.120	-0.188+	-0.153
	(0.116)	(0.114)	(0.117)	(0.113)	(0.114)
Age (in years)	-0.076*	-0.090**	-0.066*	-0.074*	-0.094**
	(0.031)	(0.031)	(0.032)	(0.030)	(0.031)
Age squared	0.001+	0.001*	0.001+	0.001*	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Apprenticeship	0.305+	0.280	0.298	0.232	0.272
	(0.184)	(0.180)	(0.186)	(0.178)	(0.179)
University	0.438*	0.377+	0.413*	0.338+	0.407*
	(0.201)	(0.195)	(0.203)	(0.195)	(0.193)
Part-time	-0.207	-0.322*	-0.204	-0.207+	-0.280*
	(0.129)	(0.125)	(0.131)	(0.124)	(0.124)
Firm size:5 ≤ x < 20 employees	0.246	0.115	0.134	0.176	0.116
	(0.218)	(0.209)	(0.210)	(0.207)	(0.212)
Firm size:20 < x < 200 empl.	-0.124	-0.207	-0.267	-0.210	-0.202
	(0.214)	0.208)	(0.205)	0.207)	(0.208)
Firm size:200 < x < 2000 empl.	0.127	0.078	0.033	0.059	0.075
	(0.215)	(0.209)	(0.213)	(0.211)	(0.211)
Firm size: x ≥ 2000 empl.	0.067	-0.058	-0.102	-0.049	-0.051
	(0.223)	(0.219)	(0.218)	(0.218)	(0.220)
Public sector	0.277*	0.287*	0.268*	0.320**	0.264*
	(0.112)	(0.112)	(0.113)	(0.111)	(0.112)
Married	0.329*	0.273*	0.364**	0.320*	0.300*
	(0.131)	(0.131)	(0.138)	(0.129)	(0.130)
Children in the household	-0.074	0.004	-0.099	-0.042	-0.032
	(0.127)	(0.124)	(0.132)	(0.124)	(0.124)
White collar worker	0.323**	0.362**	0.287*	0.292*	0.341**
	(0.120)	(0.118)	(0.120)	(0.117)	(0.118)
Self-employed	0.451+	0.396	0.354	0.440+	0.357
	(0.256)	(0.249)	(0.244)	(0.245)	(0.246)
Pretest09	-0.104	-0.132	-0.108	-0.108	-0.106
	(0.121)	(0.122)	(0.126)	(0.119)	(0.121)
Pretest10	-0.032	-0.037	-0.029	-0.048	-0.039
	(0.120)	(0.119)	(0.124)	(0.119)	(0.119)
N	868	894	845	931	897
R^2	0.15	0.15	0.15	0.14	0.15

Source: SOEP pretests 2008-2010. For additional information, see Table 1.