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Deprivation: an Empirical Link

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# Subjective Well-Being and Relative Deprivation: an Empirical Link\*

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## Abstract

This paper explores the relationship between two well-established concepts of measuring individual well-being: the concept of *happiness*, i.e. self-reported level of satisfaction with income and life, and *relative deprivation/satisfaction*, i.e. the gaps between the individual's income and the incomes of all individuals richer/poorer than him. Operationalizing both concepts using micro panel data from the German Socio-Economic Panel, we provide empirical evidence for subjective well-being depending more on relative satisfaction than on absolute levels of income. This finding holds even after controlling for other influential factors in a multivariate setting.

**JEL** Classification Number: D63, I31, D31.

**Keywords:** Relative Deprivation, Satisfaction, SubjectiveWell-Being, SOEP.

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# 1 Introduction

There is one question that we often ask: “Are we satisfied with income and with our life in general?”

We can be satisfied in absolute terms, but often our level of satisfaction depends on what we see around us. As such, there is a relative notion according to which we compare ourselves to neighbors, colleagues, more generally, to a reference group, and it matters where we perceive ourselves in the social hierarchy. Social status of an individual plays, indeed, an important role in the determination of his well-being (see e.g. Weiss and Fershtman, 1998).

In this context Runciman (1966) defined the concept of relative deprivation as follows: “We can roughly say that [a person] is relatively deprived of  $X$  when (i) he does not have  $X$ ; (ii) he sees some other person or persons, which may include himself at some previous or expected time, as having  $X$ , (iii) he sees it as feasible that he should have  $X$ ”. He further adds: “The magnitude of a relative deprivation is the extent of the difference between the desired situation and that of the person desiring it”. Building on Runciman, Yitzhaki (1979) considering income as the object of relative deprivation proved that an appropriate index of aggregate deprivation is the absolute Gini index; Hey and Lambert (1980) provided an alternative motivation of Yitzhaki’s result. Kakwani (1984) introduced a useful graphical device, the relative deprivation curve, to represent the gaps between the individual’s income and the incomes of all individuals richer than him, as a proportion of mean income, and proved that the area under this curve is the Gini coefficient. Duclos (2000) has shown that a generalization of Gini, the s-Ginis, could be interpreted as indices of relative deprivation. Chakravarty, Chattopadhyay and Majumder (1995), Chakravarty (1997), Chakravarty and Moyes (2003), and Chateauneuf and Moyes (2003) have proposed deprivation quasi-orderings. Multidimensional indices of deprivation, on the other hand, have been proposed by Bossert, D’Ambrosio and Peragine (2003), Brandolini and D’Alessio (1998), Tsakloglou and Papadopoulos (2002), Whelan, Layte, Maitre and Nolan (2002) among others.

The focus of this paper is on unidimensional indices of deprivation, i.e. those derived uniquely from income. Absolute individual deprivation is simply the sum of the gaps between the individual’s income and the incomes of all individuals richer than him, while in the relative case, the income gaps are normalized by mean income. The concept of satisfaction is generally considered the dual of that of deprivation. Hence, in measuring relative satisfaction the comparison is conducted over individuals who are poorer.

Surprisingly, this extensive theoretical literature on satisfaction and deprivation has not had, to the best of our knowledge, a relevant impact in the empirical applications.<sup>1</sup> However, there is micro data available constituting unique sources for this purpose, given that these datasets include individuals reporting their perceived level of satisfaction with income and with life in general, allowing to

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<sup>1</sup>Exceptions to this are Kakwani (1984) and Duclos (2000) with an application to Australian and Canadian data respectively, Duclos and Grègoire (2002) with an application to Belgium, Denmark, Italy and USA focussing only on the lower tail of the income distribution.

compare the proposed indices with personal assessments.

Self-reported variables have been increasingly used in the economics literature on happiness.<sup>2</sup> A significant positive bivariate relationship has been found between happiness/satisfaction and income, holding for household income, both adjusted and unadjusted for household size, as reported by Easterlin (2001). But this relationship is quite “modest”,<sup>3</sup> as Easterlin (2001) wrote, and “it is further weakened by the introduction of controls of other variables, such as unemployment and education”.

The aim of our paper is to investigate what appeared to us the alternative natural relationship: that between subjective well-being, i.e. self-reported level of satisfaction with income and life, and relative deprivation/satisfaction, i.e. the gaps between the individual’s income and the incomes of all individuals richer/poorer than him, as a proportion of mean income. This is similar in spirit to Clark and Oswald (1996) where the link between happiness/satisfaction and a ‘comparison’ income level is explored. The comparison income level is calculated using a standard form Mincer earnings equation or, alternatively, drawn from an external data source. We, on the other hand, aim at joining two branches of the economic literature on relative satisfaction/deprivation and happiness/satisfaction.

After a brief review of the theoretical literature on relative deprivation/satisfaction (Section 2), we describe our measures of subjective well-being (Section 3) and the employed data and methods (Section 4). Section 5 quantifies the degree of relative deprivation in Germany over the period 1990 to 2003. More interesting, however, we apply multivariate models making explicit use of the panel nature of the underlying data, to explain the variation in perceived satisfaction by variation in income and relative deprivation controlling for some other influential factors. Section 6 concludes. The most important empirical result is illustrated by the yearly deprivation curves: relative deprivation is quite stable no matter the economic turbulence associated with the German unification process. Continuing on Easterlin (2001), we confirm a modest simple correlation between subjective well-being and income (equalized using the square root of the number of household members) of 0.35. However, the simple correlation with relative satisfaction is as high as 0.44. This finding holds even after controlling for other influential factors in a multivariate setting.

## 2 The Measurement of Deprivation

Following Yitzhaki (1979), income is the object of relative deprivation, as income should be considered an index of the individual’s ability to consume commodities. The notation we use throughout the paper is the following. For

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<sup>2</sup>See Easterlin (2002), and Frey and Stutzer (2002) for an extensive survey. For a discussion on the various uses of subjective outcomes as a focus of interest for economists see Hamermesh (2004).

<sup>3</sup>The simple correlation between happiness and income in the United States, 1994 data, for example, is only 0.20, as shown by Easterlin (2001) p.468.

a population of size  $n$ , the set of income distributions is denoted by  $\mathbb{D}^n$ , the non-negative orthant of the Euclidean  $n$ -space  $\mathbb{R}^n$  with the origin deleted. An income distribution is a vector  $x = (x_1, \dots, x_n)$  and the set of all possible income distributions is  $\mathbb{D} = \bigcup_{n \in \mathbb{N}} \mathbb{D}^n$ , where  $\mathbb{N}$  is the set of positive integers. For all  $n \in \mathbb{N}$ ,  $x \in \mathbb{D}^n$ , we indicate the mean of  $x$  as  $\lambda(x)$ , and the illfare ranked permutation of  $x$  is  $\bar{x} = (\bar{x}_1, \dots, \bar{x}_n)$ , that is  $\bar{x}_1 \leq \dots \leq \bar{x}_n$ .

Yitzhaki (1979), Hey and Lambert (1980) specify the deprivation felt by a person with income  $x_i$  with respect to a person with income  $x_j$  as:

$$d_i(x) = \begin{cases} (x_j - x_i) & \text{if } x_i < x_j \\ 0 & \text{else} \end{cases}, \quad (1)$$

while the deprivation function of the person with income  $x_i$  is:

$$D_i(x) = \frac{\sum_{j=i+1}^n (\bar{x}_j - \bar{x}_i)}{n}. \quad (2)$$

Aggregating (2) we obtain total deprivation, which is actually average deprivation, in the whole society:

$$D(x) = \frac{\sum_{i=1}^n \sum_{j=i+1}^n (\bar{x}_j - \bar{x}_i)}{n^2}, \quad (3)$$

which is equal to the product of the mean income  $\lambda(x)$  and the Gini coefficient,  $G(x)$ , i.e. the absolute Gini coefficient.

Analogously, indicating the satisfaction level by  $S$ ,  $S(x) = \lambda(x) - D(x)$  and  $S = \lambda(x)(1 - G(x))$ .

Chakravarty and Chakraborty (1984) generalize this index proposing a normative index of deprivation.

Following this early literature, Chakravarty (1997), building on Kakwani (1984), proposes to look at a relative concept of deprivation,<sup>4</sup> by taking as a measure of deprivation felt by a person with income  $x_i$  with respect to a person with income  $x_j$ , their income share differential,  $\frac{d_i(x)}{\lambda(x)}$ . Now, the total relative deprivation function of the person with income  $x_i$  is:

$$D_i^r(x) = \frac{\sum_{j=i+1}^n (\bar{x}_j - \bar{x}_i)}{n\lambda(x)}. \quad (4)$$

We can rewrite  $D_i^r(x)$  in (4) as:

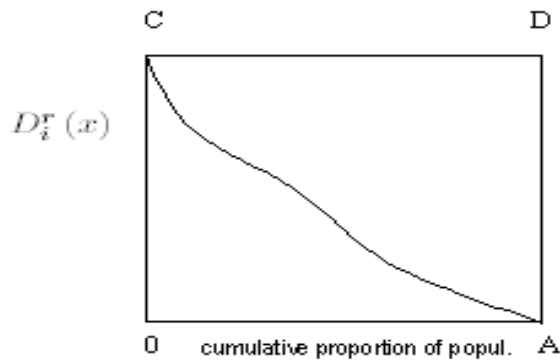
$$D_i^r(x) = 1 - L(x_i) - \frac{(n-i)\bar{x}_i}{n\lambda(x)}, \quad (5)$$

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<sup>4</sup>A clarification might here be needed on the use of the term 'relative'. Deprivation, whether absolute or relative as defined in the introduction, is always a relative concept in that it "involve(s) a comparison with the imagined situation of some other person or group. This other person or group is the 'reference group', or more accurately the 'comparative reference group'" (Runciman, 1966, p. 11). In what follows we use the term relative as opposed to absolute deprivation as defined in page 2, referring to relative deprivation simply as deprivation.

where  $L(x_i) = \frac{\sum_{j=1}^i \bar{x}_j}{n\lambda(x)}$  is the cumulative share of the total income  $n\lambda(x)$  enjoyed by the bottom  $\frac{i}{n}$  ( $0 \leq i \leq n$ ) fraction of the population.<sup>5</sup> The complement of  $D_i^r(x)$  is regarded as the relative satisfaction function of the person with income  $x_i$ .

Kakwani defines the relative deprivation curve corresponding to the distribution  $x$  as the plot of  $D_i^r(x)$  against the cumulative proportion of population  $\frac{i}{n}$  ( $0 \leq i \leq n$ ) and  $D^r(x_0) = 1$ . The relative deprivation curve is downward sloping but no definite conclusion can be drawn regarding its curvature (See Chakravarty, Chattopadhyay and Majumder, 1995).



The relative deprivation curve.

If the Lorenz curve coincides with the egalitarian line (i.e. in absence of inequality), then the relative deprivation curve coincides with the horizontal line OA. On the other hand, if there is maximum inequality, the curve coincides with CD. The area under the deprivation curve is the Gini coefficient (see Kakwani, 1984).

It is clear that there is a link between inequality and deprivation. The connection proceeds further but inequality and deprivation are two different concepts. Given two income distributions  $x, y \in \mathbb{D}^n$ , we say that  $x$  dominates  $y$  by the relative deprivation criterion if the relative deprivation curve of  $x$  lies nowhere below that of  $y$  (Chakravarty, 1994). If  $y$  dominates  $x$  in the Lorenz sense, this does not imply that  $x$  dominates  $y$  by the relative deprivation criterion.

<sup>5</sup>The graph of  $L(x_i)$  against  $\frac{i}{n}$ , where  $i = 0, 1, \dots, n$  and  $L(x_0) = 0$  is the well known Lorenz curve.



### 3 Measuring Subjective Well-Being

Generally, subjective well-being is measured by interviewing people in surveys using a single-occasion, self-report question.<sup>6</sup> Papers on this subject make use of both cross-sectional data (e.g. Eurobarometer Surveys, United States' General Social Survey), and panel data (e.g. the German Socio-Economic Panel and the European Community Household Panel). We decided to investigate the relationship between subjective well-being and relative deprivation/satisfaction focussing on panel data since the latter allow to control for otherwise unobserved individual characteristics. This is especially important if these unobservables are systematically correlated with reported subjective well-being. In particular, the dataset used in the paper is the German Socio-Economic Panel (SOEP, see the following section). Our measures of subjective well-being, i.e. 'satisfaction with income' and 'satisfaction with life in general' are measured on an 11-point scale, ranging from 0 ('completely dissatisfied') to 10 ('completely satisfied').

Landua (1991) argues that there is evidence of panel effects concerning these satisfaction scales, i.e. respondents tend to use these scales differently after 'getting used' to them (especially there is a tendency away from the extreme values such as '10'). This will have to be considered when interpreting the changes in satisfaction over time. Frick, Goebel, Schechtman, Wagner, and Yitzhaki (2004) confirm this finding for the recent SOEP data providing evidence for learning effects on behalf of the respondents with respect to satisfaction as well as income.

### 4 The Data and Methods

The German Socio-Economic Panel (SOEP) is an ongoing panel survey with a yearly re-interview design. The starting sample in 1984 was almost 6,000 households. A sample of about 2,200 East German households was added in June 1990, half a year after the fall of the Berlin wall. This gives a very good picture of the GDR society on the eve of the German currency, social and economic unification which happened on July 1, 1990. In 1994/95 an additional subsample of 500 immigrant households was included to capture the massive influx of immigrants since the late 1980s. Finally, in 1998 and 2000 two more random samples were added which increased the overall number of interviewed households in 2000 to about 13,000 with approximately 24,000 individuals aged 17 and over.

The data used in this analysis covers the period 1990 (the first data available for the East German sample) to 2003 (the most recent available data). Due to the above mentioned learning effects, we exclude wave 1 of the more recently started sub-samples. Our overall sample is pooling all adult respondents with valid information on income and subjective satisfaction, leaving us with approximately 188,000 observations based on 29,800 individuals in East and West

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<sup>6</sup>For a detailed description of the various methods used in surveys for the measurement of life satisfaction, see Schyns (2003).

Germany.

The income measure we investigate is monthly net household income. This so-called ‘income screener’ is supposed to give a measure of the more regular income components received by all household members at the time of the interview. This variable might be an inferior measure of economic well-being when compared to annual income since it tends to neglect certain irregular income components (like Christmas bonuses, annual bonuses, etc.) but it certainly fits better to our time-dependent measures of subjective well-being.<sup>7</sup> In order to compare income over time, all income measures are deflated to 2000 prices, also accounting for purchasing power differences between East and West Germany. In order to control for differences in household size and the economies of scales, we apply an equivalence scale with an elasticity of 0.5, given by the square root of household size.

Given the ordinal nature of the dependent variables on subjective well-being (perceived satisfaction with income and life in general) an appropriate regression model would be an ordered probit. In order to make full use of the panel nature of our data, controlling for otherwise unobserved individual characteristics and potentially different use of the underlying satisfaction scale (running from 0 to 10) across individuals, we should apply a fixed effects estimator. Unfortunately, such a fixed-effects ordered probit estimator does not exist in standard statistical software packages. As an approximation, however, we make use of a fixed-effects regression model (see also Hamermesh, 2001, Schwarze and Haerpfner, 2003, and Ferrer-i-Carbonell and Frijters, 2004).

## 5 The Results

The relative deprivation curves from 1990 to 2003 are plotted in Figure 1. The years that we are analyzing were of high economic turbulence for Germany since it is the decade that followed the unification. This process has, surprisingly, very little effect on relative deprivation as shown from the annual total relative deprivation functions of the individuals. The latter over time are almost identical.

The area under the relative deprivation curve is the Gini coefficient, in this framework interpreted as a measure of total relative deprivation. Its value is reported in Table 1. Over the period the Gini coefficient varies little between 0.26 and 0.24 with a tendency towards rising inequality in the most recent years. Its complement to 1 is the total relative satisfaction measure. We report its value in the same table, even if it is very easily computable, since in the multivariate analysis we use relative satisfaction as explanatory variable. The same table contains means of the self-reported satisfaction with income and with life in

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<sup>7</sup>Further research will have to investigate the relationship of self-reported satisfaction and income-related item non-response. Preliminary results indicate that persons with missing income data on average are as satisfied with their income as well as with their life in general as people who do provide a valid measure of income. However, looking at the extreme values of income satisfaction, i.e. persons with satisfaction values of 0 or 10, the share of observations with missing income data is found to be slightly above average.

general. These variables are expressed on an 11 point scale. Income satisfaction is on average consistently lower than life satisfaction. Over the years we do not observe large aggregate variation. On the one hand, satisfaction with income ranges from 6.092 in 1997 to 6.523 in 2001; on the other hand, satisfaction with life reaches its minimum in 1997, being equal to 6.778, but the maximum value is registered in the year of the German unification, 7.113 in 1990.<sup>8</sup> Results for most recent years indicate a parallelism of rising inequality and declining subjective well-being.

Our results, presented in Table 2, confirm the findings of Easterlin (2001), suggesting that the natural relationship is more between subjective well-being and relative satisfaction/deprivation rather than between subjective well-being and income itself. The next step is to investigate whether this relationship holds once we control for various influential factors such as personal and institutional characteristics. In our following multivariate regression models, we control for sex, age (age squared), marital status, immigration status, education, household composition, home ownership (as a proxy for household wealth) and unemployment.<sup>9</sup> It should be noted that in the fixed-effect specification the time independent variables sex and immigration status are dropped from the estimation (see the Appendix for alternative random effect specifications including these controls). In order to control for potential panel or learning effects, we also include a dummy variable indicating 3 and more interviews as a proxy for the interviewing experience of individuals in the panel. Institutional control variables include the annual GDP growth rates and unemployment rates. We control for the political orientation differentiating individuals with “strong left”, “left”, “right”, “strong right”, and “no political orientation”. The political orientation variables are informative of preferences and values of the individuals. “Lefties” might be more interested in an egalitarian society while “righties” favour private responsibility and economic success, i.e. “if you work hard, you also should earn more”. As a consequence of this assumption in the model on income satisfaction “strong righties” *ceteris paribus* should be happier than others, while in the model on life satisfaction these two groups should not behave differently. Additional control variables include interaction terms on region (East/West Germany) and year of observation (for readability purposes the latter are not reported in Tables 3 and 4). All the regression models are conducted separately with income satisfaction and life satisfaction respectively as dependent variables. In both cases, we first estimate a base model considering only the above mentioned controls (Model 1). As a second step we introduce separately in the regression equivalent income (Model 2), income rank (Model 3), and relative satisfaction (Model 4). Finally Model 5 includes all those measures

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<sup>8</sup>See appendix Table A-1 for a detailed East-West comparison. Results show that average values of West Germany are rather stable for all the variables, while the rapid process of catching up to Western levels in the East of the country almost came to an end in the mid-1990s. Most interestingly, the measures of subjective well-being for East Germany show a drastic decline from 1990 to 1991, indicating a change in the reference group of East Germans.

<sup>9</sup>This unemployment index is calculated at the aggregate household level, relating the number of months in registered unemployment over the previous year to the number of months with potential employment of all adult household members.

at once. Appendix table A-2 gives basic descriptive statistics for all relevant data used in the regression estimations.

Results on the fixed-effects estimators for both measures of subjective well-being, satisfaction with income and with life in general, are given in Tables 3 and 4, respectively. Starting with the base model in Table 3 on income satisfaction, the personal control variables yield in principle the expected results: better educated and married people and those who live together with dependent children in the household tend to be more satisfied. By distinguishing on political orientation we conclude that the “(strong) righties” are the only group more satisfied with their income. Homeownership is also positively related to income satisfaction, while the experience of unemployment has the expected detrimental effect on subjective well-being. In principle these results hold also for satisfaction with life (in Table 4). Persons without political orientation are less satisfied with life in general, i.e., we find positive effects for subjective well-being for all 4 groups (“strong left”, “left”, “right” and “strong right”), and these are more pronounced among the two groups with “strong” political orientation.<sup>10</sup> The institutional control variables also ‘behave’ as expected: in boom periods of the business cycle people are *ceteris paribus* more satisfied, while times of high unemployment exert a dampening effect. With respect to the panel or learning effect, our consistently negative coefficient for ‘number of interviews’ confirm the findings of Landua (1991) and Frick, Goebel, Schechtman, Wagner, and Yitzhaki (2004). The interaction terms on region and year of observation (not included in Tables 3 and 4) indicate a continuously lower level of satisfaction among East Germans, and an overall tendency towards a reduction in satisfaction among West Germans as well.

More important to our research question appears to be the comparison of Models 2 to 4, where we include alternatively measures of absolute income, income rank, and relative satisfaction, respectively. Confirming our bivariate results from Table 2, it appears that after controlling for various personal and institutional characteristics, the highest correlation is given by the relative satisfaction. Including income related variables (Models 2 to 5 in Tables 3 and 4) causes noticeable effects with respect to the control variables: becoming ‘owner occupier’ exerts a positive effect on *life* satisfaction, whereas the additional consideration of income reverses the ownership effect on *income* satisfaction. Including all three measures at the same time (in Model 5), we find only weak relationships for income level and income rank but a large and highly significant coefficient for relative satisfaction. These findings suggest that level and changes in subjective well-being in fact are driven more by the relative satisfaction an individual derives from its position in a society than by income level itself. This finding again holds for both, perceived satisfaction with income as well as with life in general. Not surprisingly, a given sum of money, i.e. the absolute level of income, still retains a slightly significant explanatory power for *income* sat-

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<sup>10</sup>In fact, the size of the significant coefficients is about the same for both “left” and “right” (about 0.03 in all models) as well as for “strong left” and “strong right” (above 0.1 in all models), respectively. Also remarkable, the size of these effects appears to be independent of the consideration of any income measure.

isfaction (Table 3). On the other hand, the simultaneous inclusion of relative satisfaction measure renders the effect of absolute income on satisfaction with *life* in general almost insignificant (Table 4).

## 6 Conclusion

Are we satisfied with income and with our life in general? The answer to the opening question of this paper is that people’s satisfaction depends on what they observe around them. Analyzing data for West and East Germany from 1990 to 2003 we confirm that “If people have no reason to expect or hope for more than they can achieve, they will be less discontent with what they have, or even grateful simply to be able to hold on to it. But if, on the other hand, they have been led to see as a possible goal the relative prosperity of some more fortunate community with which they can directly compare themselves, then they will remain discontent with their lot until they have succeeded in catching up” (Runciman, 1966). Happiness/satisfaction is a relative notion indicating that people derive their perceived well-being from being *richer* not from being simply rich.

Future work may relax our basic assumption of a single, i.e. nation wide, reference group.<sup>11</sup> Alternative reference group specifications may be based on e.g. region, family, sex or labor market status.

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<sup>11</sup>The identification of the appropriate reference groups is a very difficult task that we decided not to face in this paper. It could even be possible that the same individual have different reference groups, one for each variable of interest (see Runciman, 1966 for a clear discussion of this issue). We decided to be as neutral as possible and do not influence our results with the arbitrary choice of different reference groups for the German society.

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## Tables:

**Table 1: Income inequality, Relative Satisfaction and measures of Subjective Well-Being in Germany 1990-2003**

Year	Relative Deprivation (=Gini)	Relative Satisfaction = (1-Relative Deprivation)	Subjective Well-Being: Income Satisfaction	Subjective Well-Being: Life Satisfaction
	Mean			
1990	0.260	0.740	6.455	7.133
1991	0.257	0.743	6.470	7.094
1992	0.251	0.749	6.349	7.023
1993	0.251	0.749	6.322	6.977
1994	0.251	0.749	6.189	6.885
1995	0.260	0.740	6.258	6.858
1996	0.249	0.751	6.272	6.878
1997	0.240	0.760	6.092	6.778
1998	0.241	0.759	6.157	6.837
1999	0.245	0.755	6.257	6.974
2000	0.246	0.754	6.419	6.907
2001	0.247	0.753	6.523	7.095
2002	0.262	0.738	6.294	6.908
2003	0.266	0.734	6.181	6.859
Total	0.252	0.748	6.303	6.946

Source: Authors' calculation from SOEP.

**Table 2: Correlation of measures of subjective well-being, income, income rank, and relative satisfaction/deprivation in Germany 1990-2003**

	Subjective Well-Being: Income Satisfaction	Subjective Well-Being: Life Satisfaction	Equivalent Income	Income Rank
Subjective Well-Being: Life Satisfaction	0.5039	-	-	-
Equivalent Income	0.3524	0.1798	-	-
Income Rank	0.4237	0.2167	0.8226	-
Relative Satisfaction = (1-Relative Deprivation)	0.4356	0.2257	0.7695	0.9647

Source: Authors' calculation from SOEP.



**Table 3: Correlates of Subjective well-being (income satisfaction) in Germany 1990-2003 - Results from fixed effects models**

	(1)	(2)	(3)	(4)	(5)
	<b>Income Satisfaction</b>				
Male	-	-	-	-	-
Age	0.008 (0.006)	-0.020** (0.006)	-0.021** (0.006)	-0.008 (0.006)	-0.010 (0.006)
Age squared	0.0003** (0.000)	0.0004** (0.000)	0.001** (0.000)	0.0004** (0.000)	0.0003** (0.000)
Native Born	-	-	-	-	-
Years of Education	0.026** (0.006)	0.016** (0.006)	0.010+ (0.005)	0.010+ (0.005)	0.010+ (0.005)
Number of Children in HH	0.041** (0.009)	0.123** (0.009)	0.178** (0.009)	0.157** (0.009)	0.161** (0.009)
Owner occupier	0.102** (0.018)	-0.016 (0.018)	-0.081** (0.017)	-0.072** (0.017)	-0.076** (0.017)
Unemployment Index	-0.010** (0.000)	-0.008** (0.000)	-0.007** (0.000)	-0.006** (0.000)	-0.006** (0.000)
Married	0.295** (0.020)	0.268** (0.020)	0.244** (0.019)	0.217** (0.019)	0.219** (0.019)
3 and more interviews	-0.029+ (0.017)	-0.031+ (0.017)	-0.024 (0.017)	-0.023 (0.017)	-0.023 (0.017)
Political orientation: Strong left	0.021 (0.020)	0.029 (0.020)	0.026 (0.020)	0.022 (0.020)	0.023 (0.020)
Political orientation: Left	-0.010 (0.015)	-0.013 (0.015)	-0.017 (0.015)	-0.019 (0.015)	-0.019 (0.015)
Political orientation: Right	0.031+ (0.018)	0.022 (0.018)	0.018 (0.018)	0.018 (0.017)	0.018 (0.017)
Political orientation: Strong right	0.078** (0.024)	0.070** (0.023)	0.064** (0.023)	0.065** (0.023)	0.065** (0.023)
GDP-growth rate	0.199** (0.019)	0.153** (0.018)	0.096** (0.018)	0.083** (0.018)	0.084** (0.018)
Unemployment rate	-0.054** (0.008)	-0.040** (0.008)	-0.043** (0.008)	-0.073** (0.008)	-0.070** (0.008)
Equivalent Income / 1000	-	0.721** (0.010)	-	-	0.045** (0.015)
Income rank	-	-	2.420** (0.025)	-	0.187* (0.079)
Relative Satisfaction	-	-	-	4.078** (0.040)	3.671** (0.116)
Constant	4.759** (0.237)	4.906** (0.234)	4.801** (0.231)	2.731** (0.231)	2.946** (0.237)
Observations	188293	188293	188293	188293	188293
Number of individuals	29842	29842	29842	29842	29842
R-squared	0.03	0.06	0.09	0.09	0.09

+ significant at 10%; \* significant at 5%; \*\* significant at 1% (Standard errors in parentheses).  
Additional control variables include interaction terms on region (East/West) and year of observation.

Source: Authors' calculation from SOEP.

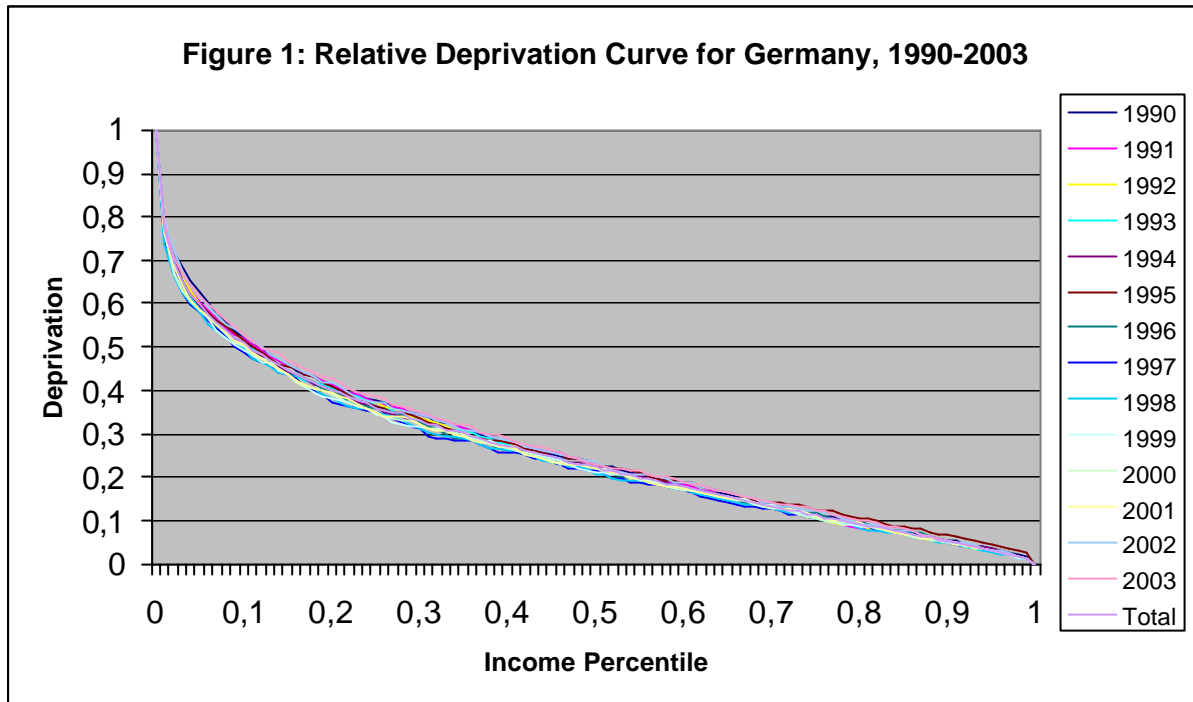
**Table 4: Correlates of Subjective well-being (life satisfaction) in Germany 1990-2003  
- Results from fixed effects models**

	(1)	(2)	(3)	(4)	(5)
	<b>Life Satisfaction</b>				
Male	-	-	-	-	-
	-	-	-	-	-
Age	0.030** (0.005)	0.023** (0.005)	0.023** (0.005)	0.026** (0.005)	0.027** (0.005)
Age squared	-0.0003** (0.000)	-0.0004** (0.000)	-0.0003** (0.000)	-0.0003** (0.000)	-0.0003** (0.000)
Native Born	-	-	-	-	-
	-	-	-	-	-
Years of Education	0.013** (0.005)	0.011* (0.005)	0.009* (0.005)	0.009+ (0.005)	0.009* (0.005)
Number of Children in HH	0.007 (0.007)	0.029** (0.007)	0.042** (0.007)	0.039** (0.007)	0.036** (0.007)
Owner occupier	0.104** (0.015)	0.074** (0.015)	0.058** (0.015)	0.057** (0.015)	0.060** (0.015)
Unemployment Index	-0.005** (0.000)	-0.004** (0.000)	-0.004** (0.000)	-0.004** (0.000)	-0.004** (0.000)
Married	0.215** (0.016)	0.208** (0.016)	0.202** (0.016)	0.193** (0.016)	0.191** (0.016)
3 and more interviews	-0.163** (0.014)	-0.164** (0.014)	-0.162** (0.014)	-0.162** (0.014)	-0.162** (0.014)
Political orientation: Strong left	0.125** (0.017)	0.127** (0.017)	0.127** (0.017)	0.126** (0.017)	0.125** (0.017)
Political orientation: Left	0.029* (0.013)	0.028* (0.013)	0.027* (0.013)	0.026* (0.013)	0.026* (0.013)
Political orientation: Right	0.031* (0.015)	0.029* (0.015)	0.028+ (0.015)	0.028+ (0.015)	0.028+ (0.015)
Political orientation: Strong right	0.108** (0.019)	0.106** (0.019)	0.105** (0.019)	0.105** (0.019)	0.105** (0.019)
GDP-growth rate	0.174** (0.015)	0.162** (0.015)	0.148** (0.015)	0.143** (0.015)	0.143** (0.015)
Unemployment rate	-0.049** (0.007)	-0.046** (0.007)	-0.046** (0.007)	-0.054** (0.007)	-0.057** (0.007)
Equivalent Income / 1000	-	0.187** (0.008)	-	-	0.023+ (0.012)
	-	-	-	-	-
Income rank	-	-	0.617** (0.021)	-	-0.303** (0.067)
	-	-	-	-	-
Relative Satisfaction	-	-	-	1.105** (0.034)	1.498** (0.098)
	-	-	-	-	-
Constant	6.090** (0.195)	6.128** (0.195)	6.100** (0.194)	5.540** (0.195)	5.344** (0.201)
Observations	188293	188293	188293	188293	188293
Number of individuals	29842	29842	29842	29842	29842
R-squared	0.03	0.03	0.03	0.03	0.03

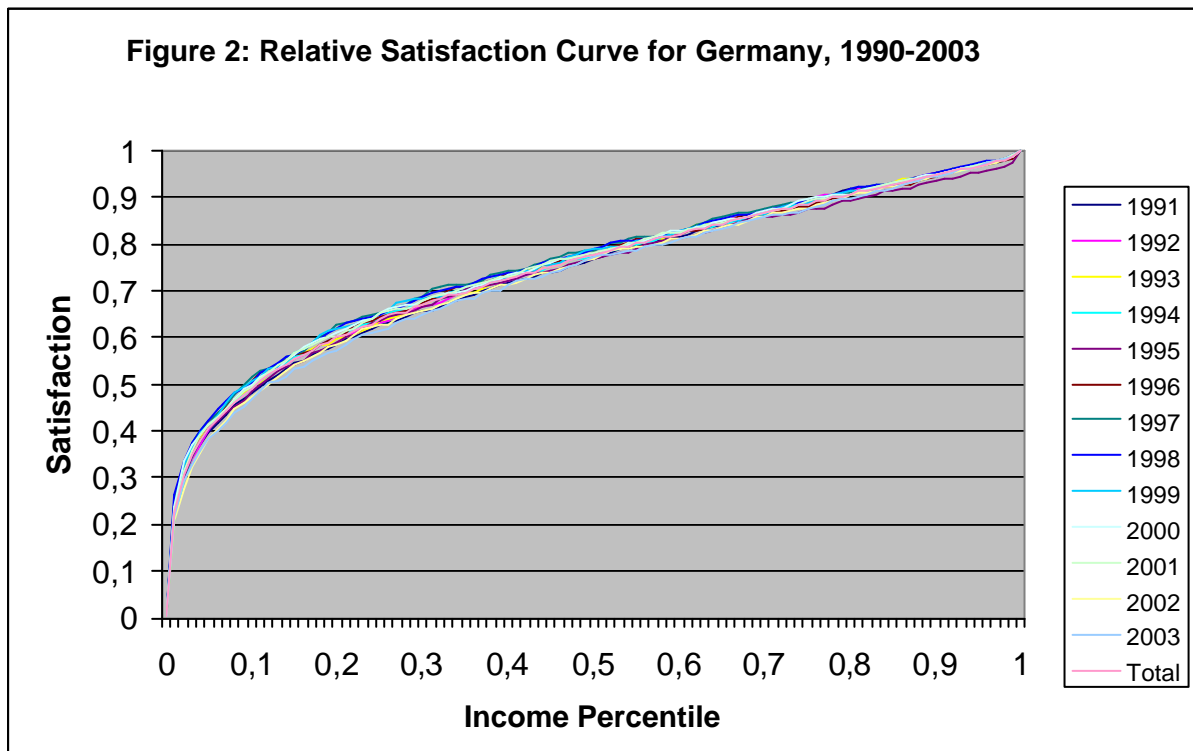
+ significant at 10%; \* significant at 5%; \*\* significant at 1% (Standard errors in parentheses).  
Additional control variables include interaction terms on region (East/West) and year of observation.

Source: Authors' calculation from SOEP.

## Figures:



Source: Authors' calculation from SOEP.



Source: Authors' calculation from SOEP.

## Appendix:

Table A-1: Equivalent income, relative satisfaction/deprivation, and measures of Subjective Well-Being in Germany 1990-2003 by region and year

Year	Equivalent Monthly Income (in EURO)		Relative Satisfaction = (1-Relative Deprivation)		Subjective Well-Being: Income Satisfaction		Subjective Well-Being: Life Satisfaction	
	West	East	West	East	West	East	West	East
	Mean							
1990	1406	860	0.777	0.599	6.693	5.511	7.277	6.565
1991	1402	882	0.778	0.606	6.897	4.727	7.356	6.018
1992	1414	955	0.777	0.636	6.704	4.886	7.249	6.091
1993	1422	1023	0.773	0.654	6.569	5.321	7.172	6.182
1994	1414	1082	0.766	0.680	6.379	5.433	7.044	6.247
1995	1449	1128	0.754	0.683	6.434	5.548	6.980	6.368
1996	1435	1162	0.763	0.706	6.437	5.619	7.004	6.379
1997	1410	1170	0.771	0.716	6.259	5.434	6.893	6.325
1998	1413	1185	0.770	0.719	6.324	5.513	6.942	6.432
1999	1467	1201	0.767	0.708	6.433	5.567	7.089	6.521
2000	1496	1204	0.767	0.698	6.577	5.742	7.015	6.446
2001	1481	1205	0.765	0.703	6.687	5.817	7.210	6.597
2002	1513	1238	0.750	0.691	6.460	5.579	7.023	6.415
2003	1531	1246	0.746	0.685	6.358	5.419	6.975	6.356
Total	1446	1105	0.766	0.676	6.518	5.427	7.092	6.351

Source: Authors' calculation from SOEP.

**Table A-2: Descriptive Statistics for variables used in regressions (random and fixed effects)**

<b>Variable</b>	<b>Mean</b>	<b>Std.Dev.</b>	<b>Min</b>	<b>Max</b>
Subj. Well-Being : Income	6.2053	2.2584	0	10
Subj. Well-Being : Life	6.9160	1.7957	0	10
Equivalent Income / 1000	1.3507	0.6817	0.0634	27.0663
Income rank	0.4887	0.2797	0.0000	1
Relative Satisfaction	0.7437	0.1671	0.0490	1
Relative Deprivation	0.2563	0.1671	0.0000	0.9509751
East Germany	0.2852	0.4515	0	1
Male	0.4847	0.4998	0	1
Age	44.9515	16.7273	14	100
Age squared	2300.4330	1639.3640	196	10000
Native Born	0.8414	0.3653	0	1
Years of Education	11.4296	2.4904	7	18
Number of Children in HH	0.5975	0.9307	0	9
Owner occupier	0.4326	0.4954	0	1
Unemployment Index	7.7838	20.9037	0	100
Married	0.6464	0.4781	0	1
3 and more interviews	0.8555	0.3516	0	1
East 1990	0.0225	0.1484	0	1
East 1991	0.0210	0.1434	0	1
East 1992	0.0200	0.1401	0	1
East 1993	0.0190	0.1364	0	1
East 1994	0.0187	0.1356	0	1
East 1995	0.0183	0.1340	0	1
East 1996	0.0182	0.1338	0	1
East 1997	0.0178	0.1321	0	1
East 1998	0.0170	0.1291	0	1
East 1999	0.0183	0.1340	0	1
East 2000	0.0181	0.1332	0	1
East 2001	0.0264	0.1603	0	1
East 2002	0.0251	0.1564	0	1
East 2003	0.0248	0.1555	0	1
West 1990	0.0470	0.2111	0	1
West 1991	0.0462	0.2100	0	1
West 1992	0.0461	0.2097	0	1
West 1993	0.0448	0.2068	0	1
West 1994	0.0440	0.2050	0	1
West 1995	0.0458	0.2090	0	1
West 1996	0.0446	0.2064	0	1
West 1997	0.0439	0.2049	0	1
West 1998	0.0417	0.2000	0	1
West 1999	0.0465	0.2106	0	1
West 2000	0.0456	0.2087	0	1
West 2001	0.0767	0.2661	0	1
West 2002	0.0723	0.2591	0	1
West 2003	0.0696	0.2544	0	1
Political orientation: Strong left	0.0897	0.2858	0	1
Political orientation: Left	0.1317	0.3382	0	1
Political orientation: Right	0.0976	0.2968	0	1
Political orientation: Strong right	0.0659	0.2481	0	1
GDP-growth rate	1.3819	1.1822	-1.09	3.22
Unemployment rate	8.8139	1.4868	5.1	10.6

**Number of observations (individuals): 188,293 (29,842)**

**Source: Authors' calculation from SOEP.**

**Table A-3: Correlates of Subjective well-being (income satisfaction) in Germany 1990-2003 - Results from random effects models**

	(1)	(2)	(3)	(4)	(5)
	<b>Income Satisfaction</b>				
Male	-0.100** (0.019)	-0.126** (0.018)	-0.149** (0.018)	-0.155** (0.018)	-0.155** (0.018)
Age	-0.043** (0.003)	-0.051** (0.003)	-0.055** (0.002)	-0.052** (0.002)	-0.053** (0.002)
Age squared	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)
Native born	0.377** (0.028)	0.285** (0.027)	0.213** (0.026)	0.209** (0.026)	0.207** (0.026)
Years of education	0.082** (0.003)	0.038** (0.003)	0.024** (0.003)	0.029** (0.003)	0.027** (0.003)
# kids in HH	-0.017* (0.007)	0.083** (0.007)	0.147** (0.007)	0.130** (0.007)	0.135** (0.007)
Owner occupier	0.309** (0.014)	0.157** (0.014)	0.087** (0.013)	0.098** (0.013)	0.091** (0.013)
Unemployment Index	-0.013** (0.000)	-0.010** (0.000)	-0.008** (0.000)	-0.007** (0.000)	-0.007** (0.000)
Married	0.385** (0.016)	0.351** (0.015)	0.311** (0.015)	0.273** (0.015)	0.277** (0.015)
Three and more interviews	-0.077** (0.016)	-0.070** (0.015)	-0.063** (0.015)	-0.065** (0.015)	-0.064** (0.015)
east1990	-1.274** (0.039)	-0.844** (0.039)	-0.512** (0.038)	-0.503** (0.038)	-0.495** (0.038)
east1991	-1.658** (0.036)	-1.339** (0.035)	-1.107** (0.035)	-1.084** (0.034)	-1.079** (0.034)
east1992	-1.168** (0.031)	-0.940** (0.031)	-0.765** (0.030)	-0.757** (0.030)	-0.754** (0.030)
east1994	-0.336** (0.035)	-0.245** (0.035)	-0.196** (0.034)	-0.154** (0.034)	-0.156** (0.034)
east1995	-0.186** (0.033)	-0.146** (0.032)	-0.111** (0.032)	-0.054+ (0.032)	-0.059+ (0.032)
east1996	0.195** (0.034)	0.155** (0.033)	0.116** (0.033)	0.137** (0.033)	0.134** (0.033)
east1997	0.111** (0.039)	0.077* (0.038)	0.045 (0.038)	0.047 (0.038)	0.046 (0.038)
east1999	-0.008 (0.037)	-0.006 (0.036)	0.043 (0.036)	0.052 (0.036)	0.049 (0.036)
east2000	-0.153** (0.038)	-0.101** (0.038)	0.026 (0.037)	0.039 (0.037)	0.034 (0.037)
east2001	0.178** (0.030)	0.144** (0.030)	0.182** (0.029)	0.169** (0.029)	0.167** (0.029)
east2002	0.206** (0.033)	0.097** (0.032)	0.091** (0.032)	0.162** (0.031)	0.148** (0.032)
east2003	0.278** (0.036)	0.135** (0.035)	0.104** (0.035)	0.213** (0.034)	0.194** (0.035)
west1991	0.565** (0.022)	0.497** (0.022)	0.422** (0.022)	0.435** (0.022)	0.433** (0.022)
west1992	0.603** (0.024)	0.503** (0.024)	0.432** (0.023)	0.448** (0.023)	0.444** (0.023)
west1993	1.170** (0.038)	0.880** (0.037)	0.681** (0.037)	0.703** (0.037)	0.694** (0.037)
west1994	0.618** (0.033)	0.477** (0.032)	0.396** (0.031)	0.462** (0.031)	0.450** (0.031)
west1995	0.709** (0.030)	0.533** (0.029)	0.463** (0.029)	0.553** (0.029)	0.536** (0.029)
west1996	1.030** (0.034)	0.789** (0.033)	0.672** (0.033)	0.726** (0.033)	0.712** (0.033)

west1997	0.984** (0.041)	0.754** (0.040)	0.610** (0.039)	0.659** (0.039)	0.647** (0.039)
west1998	0.846** (0.039)	0.659** (0.038)	0.559** (0.038)	0.605** (0.038)	0.594** (0.038)
west1999	0.783** (0.036)	0.596** (0.035)	0.556** (0.034)	0.605** (0.034)	0.591** (0.034)
west2000	0.658** (0.035)	0.509** (0.034)	0.546** (0.034)	0.587** (0.033)	0.572** (0.033)
west2001	1.001** (0.029)	0.773** (0.029)	0.729** (0.028)	0.757** (0.028)	0.743** (0.028)
west2002	1.011** (0.033)	0.699** (0.032)	0.639** (0.031)	0.734** (0.031)	0.708** (0.031)
west2003	1.099** (0.037)	0.745** (0.037)	0.657** (0.036)	0.783** (0.036)	0.753** (0.036)
Political orientation: Strong left	0.048** (0.019)	0.045* (0.018)	0.027 (0.018)	0.022 (0.018)	0.023 (0.018)
Political orientation: Left	-0.002 (0.014)	-0.009 (0.014)	-0.024+ (0.014)	-0.029* (0.014)	-0.028* (0.014)
Political orientation: Right	0.092** (0.017)	0.062** (0.016)	0.060** (0.016)	0.063** (0.016)	0.061** (0.016)
Political orientation: Strong right	0.187** (0.021)	0.139** (0.021)	0.135** (0.020)	0.143** (0.020)	0.140** (0.020)
GDP-growth rate	0.147** (0.010)	0.103** (0.009)	0.068** (0.009)	0.060** (0.009)	0.060** (0.009)
Unemployment rate	-0.200** (0.009)	-0.170** (0.008)	-0.138** (0.008)	-0.164** (0.008)	-0.161** (0.008)
Equivalent Income / 1000	-	0.784** (0.009)	-	-	0.081** (0.013)
Income rank	-	-	2.607** (0.022)	-	0.171* (0.072)
Relative Satisfaction	-	-	-	4.399** (0.035)	3.905** (0.107)
Constant	6.517** (0.091)	6.108** (0.089)	5.960** (0.088)	4.092** (0.089)	4.286** (0.098)
Observations	188293	188293	188293	188293	188293
Number of individuals	29842	29842	29842	29842	29842
Standard errors in parentheses + significant at 10%; * significant at 5%; ** significant at 1%					

Source: Authors' calculation from SOEP.

**Table A-4: Correlates of Subjective well-being (life satisfaction) in Germany 1990-2003 - Results from random effects models**

	(1)	(2)	(3)	(4)	(5)
	<b>Life Satisfaction</b>				
Male	-0.056** (0.016)	-0.064** (0.016)	-0.070** (0.015)	-0.072** (0.015)	-0.072** (0.015)
Age	-0.028** (0.002)	-0.030** (0.002)	-0.031** (0.002)	-0.031** (0.002)	-0.030** (0.002)
Age squared	0.0003** (0.000)	0.0003** (0.000)	0.0003** (0.000)	0.0003** (0.000)	0.0003** (0.000)
Native born	0.135** (0.023)	0.109** (0.023)	0.090** (0.023)	0.086** (0.023)	0.088** (0.023)
Years of education	0.039** (0.003)	0.026** (0.003)	0.023** (0.003)	0.024** (0.003)	0.024** (0.003)
# kids in HH	-0.021** (0.006)	0.008 (0.006)	0.025** (0.006)	0.023** (0.006)	0.020** (0.006)
Owner occupier	0.191** (0.011)	0.147** (0.011)	0.128** (0.011)	0.128** (0.011)	0.130** (0.011)
Unemployment Index	-0.006** (0.000)	-0.006** (0.000)	-0.005** (0.000)	-0.005** (0.000)	-0.005** (0.000)
Married	0.258** (0.013)	0.248** (0.013)	0.238** (0.013)	0.225** (0.013)	0.223** (0.013)
Three and more interviews	-0.223** (0.013)	-0.221** (0.013)	-0.219** (0.013)	-0.220** (0.013)	-0.220** (0.013)
east1990	-0.927** (0.032)	-0.804** (0.032)	-0.715** (0.032)	-0.702** (0.032)	-0.708** (0.032)
east1991	-1.184** (0.029)	-1.093** (0.029)	-1.032** (0.029)	-1.017** (0.029)	-1.019** (0.029)
east1992	-0.756** (0.026)	-0.691** (0.026)	-0.644** (0.026)	-0.636** (0.026)	-0.639** (0.026)
east1994	-0.365** (0.029)	-0.339** (0.029)	-0.327** (0.029)	-0.312** (0.029)	-0.309** (0.029)
east1995	-0.175** (0.027)	-0.163** (0.027)	-0.154** (0.027)	-0.136** (0.027)	-0.132** (0.027)
east1996	0.072** (0.028)	0.061* (0.028)	0.050+ (0.028)	0.055* (0.028)	0.058* (0.028)
east1997	0.046 (0.032)	0.037 (0.032)	0.028 (0.032)	0.027 (0.032)	0.028 (0.032)
east1999	0.003 (0.030)	0.003 (0.030)	0.017 (0.030)	0.020 (0.030)	0.019 (0.030)
east2000	-0.238** (0.031)	-0.224** (0.031)	-0.189** (0.031)	-0.182** (0.031)	-0.185** (0.031)
east2001	0.040 (0.025)	0.030 (0.025)	0.041+ (0.025)	0.038 (0.025)	0.035 (0.025)
east2002	0.098** (0.027)	0.067* (0.027)	0.067* (0.027)	0.086** (0.027)	0.091** (0.027)
east2003	0.179** (0.029)	0.139** (0.029)	0.131** (0.029)	0.161** (0.029)	0.170** (0.029)
west1991	0.352** (0.018)	0.333** (0.018)	0.313** (0.018)	0.314** (0.018)	0.318** (0.018)
west1992	0.400** (0.020)	0.372** (0.020)	0.353** (0.020)	0.355** (0.020)	0.358** (0.020)
west1993	0.926** (0.031)	0.844** (0.031)	0.791** (0.031)	0.790** (0.031)	0.796** (0.031)
west1994	0.412** (0.027)	0.372** (0.027)	0.351** (0.027)	0.367** (0.027)	0.374** (0.027)
west1995	0.447** (0.025)	0.397** (0.025)	0.380** (0.025)	0.402** (0.024)	0.411** (0.025)
west1996	0.679** (0.028)	0.611** (0.028)	0.580** (0.028)	0.591** (0.028)	0.597** (0.028)



west1997	0.590** (0.033)	0.524** (0.033)	0.486** (0.033)	0.495** (0.033)	0.502** (0.033)
west1998	0.533** (0.032)	0.479** (0.032)	0.453** (0.032)	0.463** (0.032)	0.468** (0.032)
west1999	0.482** (0.029)	0.428** (0.029)	0.419** (0.029)	0.430** (0.029)	0.433** (0.029)
west2000	0.249** (0.029)	0.206** (0.029)	0.218** (0.028)	0.228** (0.028)	0.228** (0.028)
west2001	0.578** (0.024)	0.514** (0.024)	0.503** (0.024)	0.507** (0.024)	0.508** (0.024)
west2002	0.636** (0.027)	0.547** (0.027)	0.533** (0.027)	0.555** (0.027)	0.562** (0.027)
west2003	0.727** (0.031)	0.626** (0.031)	0.605** (0.031)	0.635** (0.030)	0.645** (0.031)
Political orientation: Strong left	0.126** (0.015)	0.125** (0.015)	0.120** (0.015)	0.118** (0.015)	0.119** (0.015)
Political orientation: Left	0.029* (0.012)	0.027* (0.012)	0.023+ (0.012)	0.021+ (0.012)	0.022+ (0.012)
Political orientation: Right	0.090** (0.014)	0.082** (0.014)	0.081** (0.014)	0.082** (0.014)	0.082** (0.014)
Political orientation: Strong right	0.204** (0.017)	0.189** (0.017)	0.189** (0.017)	0.190** (0.017)	0.191** (0.017)
GDP-growth rate	0.147** (0.008)	0.135** (0.008)	0.125** (0.008)	0.122** (0.008)	0.122** (0.008)
Unemployment rate	-0.127** (0.007)	-0.119** (0.007)	-0.110** (0.007)	-0.117** (0.007)	-0.120** (0.007)
Equivalent Income / 1000	-	0.223** (0.007)	-	-	0.042** (0.011)
Income rank	-	-	0.721** (0.018)	-	-0.347** (0.062)
Relative Satisfaction	-	-	-	1.281** (0.030)	1.690** (0.091)
Constant	7.812** (0.075)	7.697** (0.075)	7.659** (0.075)	7.108** (0.076)	6.935** (0.084)
Observations	188293	188293	188293	188293	188293
Number of individuals	29842	29842	29842	29842	29842
Standard errors in parentheses + significant at 10%; * significant at 5%; ** significant at 1%					

Source: Authors' calculation from SOEP.