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## **Quantifying the psychological costs of unemployment: the role of permanent income**

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**April 2007**

### **Abstract**

Unemployment causes significant losses in the quality of life. In addition to reducing individual income, it also creates non-pecuniary, psychological costs. We quantify these non-pecuniary losses by using the life satisfaction approach. In contrast to previous studies, we apply Friedman's (1957) permanent income hypothesis by distinguishing between temporary and permanent effects of income changes. This allows us to account for intertemporal spillovers of income compensations. Our results show that, without this distinction, the non-pecuniary costs of unemployment are overestimated by roughly one-third. Nevertheless, the non-pecuniary costs of unemployment with this modified quantification method still amount to 2.3 (1.5) times the pure pecuniary costs of unemployment for men (women). This confirms the high value of work for life satisfaction.

JEL Classification: J28, J60, D91

Keywords: unemployment, happiness, life satisfaction, permanent income

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## 1. Introduction

Unemployment has a large negative effect on individual well-being. It typically generates lower self-esteem, uncertainty about the future, social isolation, stigmatization, health problems, and mental disorder. To evaluate the economic costs of unemployment, it is thus not sufficient to take only its pecuniary costs, such as individual income losses or the fiscal cost of welfare benefits and foregone taxes, into account. One also has to consider the non-pecuniary, psychological costs of unemployment.

The recent progress in life satisfaction research provides a new approach to evaluating various types of non-marketable goods, public goods and externalities. Using subjective well-being data from social surveys as a proxy for utility, the impact of unemployment can be quantified by calculating the amount of income necessary to compensate the individual for the change in well-being<sup>1</sup> associated with the loss of one's job. The amount by which the required compensation exceeds the pure income loss from unemployment indicates the non-pecuniary cost of being unemployed. Previous studies applying this life satisfaction approach found a significant drop in an individual's subjective well-being upon entering unemployment even if one fully compensated the person for the direct income loss.<sup>2</sup> For example, Winkelmann and Winkelmann (1995) calculate the non-pecuniary costs of unemployment for Germany and show that men would have to receive an additional compensation of 277 percent of their income to restore the psychological loss from unemployment. For women, the non-pecuniary costs are smaller, so that 80 percent compensation would suffice. With an average pecuniary loss from unemployment of 40 percent of income, the non-pecuniary costs of unemployment are thus about seven times larger than the direct pecuniary costs for men and twice as large for women. Applying essentially the same method, Blanchflower and Oswald (2004) find large non-pecuniary costs of unemployment also for the United States and for Great Britain.

This standard quantification method is flawed as it implicitly assumes that changes in current income only affect current well-being and thereby ignores that individuals will shift part of a temporary income change to other life periods to smooth their consumption stream over time. If reported life satisfaction depends on how much an individual actually spends on consumption rather than how much he earns at a given point in time, the standard quantification method leads to distorted results because it does not distinguish between transitory (current) and permanent (lifetime) effects of income changes. The necessity to distinguish between these two effects follows from Friedman's (1957) permanent income hypothesis (PIH), which

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<sup>1</sup> We will use the terms life satisfaction, well-being, and happiness interchangeably.

<sup>2</sup> See Clark and Oswald (1994), Gerlach and Stephan (1996), Korpi (1997), Clark et al. (2001), Frey and Stutzer (2000, 2002), Clark (2003, 2006), and DiTella et al. (2003).

states that households base their consumption decisions on their permanent rather than current income, where permanent income is the expected annuity obtainable from the discounted value of lifetime resources.<sup>3</sup> The PIH has strong implications for the quantification of non-pecuniary effects through “compensating income variations” because temporarily granted income compensations will also affect permanent income, so that subjective well-being is not only raised during the actual compensation period, but also outside of it. For example, if a person is compensated for the psychological loss during some unemployment spell, the PIH claims that she would consume only a part of the compensation payment while unemployed. To smooth her consumption path, she would spread its greater part over her entire life horizon, which would increase her life satisfaction outside her unemployment episode as well.

When applied to quantifying the non-pecuniary costs of unemployment, ignoring the positive effect of current income compensations on well-being at other times in life will underestimate the true impact of income on (lifetime) well-being, and thus overestimate the necessary monetary compensation. A simple example might illustrate this point. Consider an individual over a 2-year time horizon who is unemployed during the first year (but is compensated for the pure income loss), and is employed in the second year. Suppose that unemployment reduces life satisfaction by 1 point (on a 0-10 scale), which has to be balanced by an additional income compensation. Empirical studies show that the impact of a temporary change in income on life satisfaction can be decomposed into two effects (see van Praag et al. 2003). First, there is a temporary, perhaps psychological shock that raises life satisfaction the moment the additional income accrues. Second, there is a permanent effect that arises from smoothing the additional consumption possibilities over time. For our example, assume that an increase in income of 100 percent during the first year causes a temporary shock of 0.2 life-satisfaction points. Moreover, assume that spreading the increased consumption possibilities raises life satisfaction by 0.3 points in each of the two years. Hence, adding the effects in both years shows that a 100 percent income compensation during the first year raises total well-being by  $0.2 + 2(0.3) = 0.8$  points. Compensating the unemployment loss of 1 point thus requires an income compensation of  $1/0.8 = 125$  percent.

The standard approach of quantifying the non-pecuniary costs of unemployment, however, implicitly assumes that there are no intertemporal effects of income changes and thus ignores the second period. Consequently, it appears as if a 100 percent rise in income increases life satisfaction only by  $0.2 + 0.3 = 0.5$  points, so that a compensation of  $1 / 0.5 = 200$  percent would

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<sup>3</sup> There is strong empirical evidence for the PIH. For example, DeJuan and Seater (1999, 2006) show that permanent income has a highly significant influence on individual consumption decisions. For comprehensive surveys of the literature on empirical tests of the PIH, see Deaton (1992), Browning and Lusardi (1996), Browning and Crossley (2001), and Meghir (2004).

be necessary to balance the psychological loss from unemployment. This example highlights the importance of taking intertemporal spillovers of temporary income compensations into account to avoid overestimating the non-pecuniary costs of unemployment.

To account appropriately for the role of permanent income described by the PIH, we distinguish between transitory and permanent income changes, and thereby develop a more precise monetary equivalence measure for evaluating the non-pecuniary costs of unemployment. Using data from the German Socio-Economic Panel, we then reevaluate the non-pecuniary costs of unemployment and compare the results to those derived by standard quantification techniques in previous research. Our empirical results support our theoretical reasoning that the standard method overestimates the non-pecuniary costs of unemployment. In our estimation, the standard method predicts that the non-pecuniary costs of unemployment are 3.5 (2.5) times as large as the pecuniary costs for men (women), whereas the permanent income method shows that the non-pecuniary costs, though still important, are only 2.3 (1.5) times larger than the pecuniary costs of unemployment.

We will proceed as follows. In the next section, we describe the life satisfaction approach to quantifying psychological effects, address the role of permanent income, and present our quantification method. Section 3 describes the data, and Section 4 contains the empirical results. The quantification of the non-pecuniary cost of unemployment follows in Section 5 and Section 6 discusses some generalization of our approach and concludes.

## 2. Methodology

The true, but unobservable level of life satisfaction  $LS^*$  can be explained by a number of factors, where the functional relationship can be written as:

$$LS_{it}^* = \alpha + \beta_1 \ln Y_{it} + \beta_2 \ln \bar{Y}_i + \beta_3 UE_{it} + \beta_4 LTUE_{it} + \gamma X_{it} + \nu_i + \mu_t + \varepsilon_{it}. \quad (1)$$

In equation (1), the index  $i$  denotes a specific individual, and the index  $t$  a specific year. To account for the intertemporal effects of income described by the PIH, we separate the influence of transitory and permanent income.  $Y_{it}$  denotes the net income of individual  $i$  in year  $t$  (transitory income), and  $\bar{Y}_i$  is the average income of individual  $i$  averaged over all the years in the panel (permanent income).<sup>4</sup>  $UE_{it}$  is a dummy that signals whether or not the individual is unemployed in year  $t$ , and  $LTUE_{it}$  is an additional dummy that signals whether unemployment lasts for more than one year. The vector  $X_{it}$  contains information on other factors that can po-

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<sup>4</sup> We follow van Praag et al. (2003) in defining permanent income by the average income over all years a person is in the panel. Intuitively, and abstracting from impatience and interest effects, if the individual knows his past and future income streams and wants to smooth consumption, he will consume his average lifetime income in each period. We use logarithmic income to account for the non-linear influence of income on individual happiness.

tentially explain an individual's life satisfaction.  $\alpha$  is a constant,  $v_i$  is an individual-specific effect that captures time-invariant differences between individuals,  $\mu_t$  is a time-variant effect denoting influences in a specific year that affect all individuals equally, and  $\varepsilon_{it}$  is a random error term.

The coefficients can be interpreted as follows.  $\beta_1$  says how strongly an increase in transitory income, at a constant permanent income  $\bar{Y}_i$ , affects life satisfaction.  $\beta_2$ , on the other hand, denotes the impact of an increase in permanent income, at a constant transitory component, on current life satisfaction. Consequently, the sum  $(\beta_1+\beta_2)$  yields the effect of an increase in income over the whole time horizon on current life satisfaction. The coefficient  $\beta_3$  denotes the difference between the life satisfaction of an employed and an unemployed person with otherwise identical characteristics. The additional affect of long-term unemployment is estimated by  $\beta_4$ . The coefficients in vector  $\gamma$  measure the influence of other exogenous factors (e.g. age, sex, family status, and health) and serve as control variables to secure the comparability of different persons.

The individual level of life satisfaction cannot be observed directly. To quantify it, one has to revert to individuals' subjective assessments about their well-being as stated in social surveys. The true level of well-being is translated into scaled values (e.g. from 0 "completely dissatisfied" to 10 "completely satisfied"), so that an ordinal measure of life satisfaction,  $LS$ , is observed instead of its true level  $LS^*$ :

$$LS_{it} = z \Leftrightarrow LS_{it}^* \in [\lambda_{z-1}, \lambda_z[ \quad z \in \{0,1,\dots,10\}, \quad (2)$$

where  $\lambda_{-1} = -\infty$  and  $\lambda_{10} = \infty$ . An individual states a value  $z$  on a life satisfaction scale from 0 to 10 if his true life satisfaction is between  $\lambda_z$  and  $\lambda_{z+1}$ . We take the ordinal structure of the variable to be explained,  $LS$ , into account by conducting an ordered probit estimation. The estimated coefficients then allow determining the probability with which stated life satisfaction takes on a certain value, depending on the values of the explanatory variables. We write this probability in the form:

$$P(LS_{it} = z | Y_{it}, \bar{Y}_i, UE_{it}, LTUE_{it}, X_{it}) \quad z \in \{0,1,\dots,10\}. \quad (3)$$

### *The non-pecuniary costs of unemployment*

To determine the non-pecuniary costs of unemployment, we distinguish between a truncated and an extended model.

In the truncated model (Winkelmann and Winkelmann 1995, 1998; Blanchflower and Oswald 2004), a monetary compensation, which is paid only while unemployment persists,

affects well-being only during the unemployment spell. Changes in permanent income do not affect well-being, which amounts to assuming  $\beta_2=0$  in the econometric model (1). The compensation  $\kappa$  necessary to make an unemployed person as well off as an otherwise identical employed person is implicitly given by:<sup>5</sup>

$$P(LS_{it} = z | Y_{it}, UE_{it} = 0, X_{it}) = P(LS_{it} = z | (1 + \kappa)Y_{it}, UE_{it} = 1, X_{it}) \quad \forall z \in \{0, 1, \dots, 10\}. \quad (4)$$

The left hand side of (4) is the probability that an employed person states a life satisfaction of  $z$ . The right hand side is the probability that an identical unemployed person, who receives an income compensation of  $\kappa \cdot 100$  percent, states the same level of life satisfaction. The value of the compensation  $\kappa$ , at which both probabilities are equal for all possible values on the life satisfaction scale, determines the monetary equivalent to the non-pecuniary costs of unemployment. Applying the ordered probit method, the necessary compensation can be calculated through direct comparison between the coefficient of income ( $\beta_1$ ) and unemployment ( $\beta_3$ ). With a compensation

$$\kappa = \frac{\beta_3}{\beta_1}, \quad (5)$$

the impact of unemployment and income compensation on well-being would exactly balance, so that the estimated probabilities of stating a certain level of life satisfaction remain unchanged (see Winkelmann and Winkelmann 1998).

As already mentioned above, the truncated model implicitly imposes a restriction,  $\beta_2=0$ , which causes a misspecification and, thereby, distorts estimates of model (1) due to an omitted variable bias. To overcome this problem, we will contrast the truncated model with a model extended by permanent income.

The distortion generated by the omission of  $\bar{Y}_i$  in the truncated model consists of two opposing effects. On the one hand, one could expect that  $\bar{Y}_i$  is strongly correlated with  $Y_{it}$ . If permanent income  $\bar{Y}_i$  has a positive effect on life satisfaction in the extended model, the omitted variable bias causes a large part of this effect to be assigned to current (transitory) income  $Y_{it}$  in the truncated model. Hence, the impact of transitory income on life satisfaction ( $\beta_1$ ) is overestimated, so that the non-pecuniary costs of unemployment are underestimated. On the other hand, a temporary income compensation increases average lifetime, i.e. permanent, income. A positive influence of  $\bar{Y}_i$  on life satisfaction would then mean that a person would

<sup>5</sup> According to (1), the explanatory variables on both sides of (4) should also include  $LTUE_{it}$  if unemployment lasts longer than one year. Our empirical estimates show, however, that  $LTUE$  does not have a significant effect on well-being. To ease the exposition, we thus do not consider it in this section anymore.

benefit from such an income compensation not only during the unemployment spell, but also at all other points in life. Hence, a temporary compensation has a much stronger effect on well-being in a lifetime perspective than would be implied by restricting the analysis' time frame only to the actual unemployment episode. Since a smaller compensation would suffice to restore well-being measured over the entire lifetime, this second effect moderates the size of the non-pecuniary costs of unemployment.

The extended model (1) avoids these distortions because it accounts for the change in permanent income. To determine the necessary compensation, one has to compare the satisfaction loss from unemployment with the gains from a temporary compensation during the unemployment spell plus the gains from an increased permanent income during the rest of a person's lifetime, and find the compensation that exactly balances these effects. The change in life satisfaction during and outside the unemployment spell cannot directly be compared because well-being data is ordinal. This problem, however, can be overcome with a two-part compensation scheme. The first part of the compensation is paid during the unemployment spell and restores the probability of stating the same life satisfaction value as an employed person. This compensation raises permanent income, and thereby increases the probability that the person will state a higher level of life satisfaction outside the unemployment spell. To bring the probability distribution outside unemployment back in line with that of a continuously employed person, the second part of the compensation takes income away from the person at all times he benefits from an increased permanent income. Since the positive income compensation during unemployment and the negative compensation outside of it are both monetary measures, they can be offset against each other to calculate the "net" non-pecuniary costs of unemployment.

The compensation  $\kappa_{UE}$ , which a person has to receive during unemployment in order to fully compensate for the loss in well-being, is given by

$$\beta_3 = \beta_1 \kappa_{UE} + \beta_2 \frac{\Delta \bar{Y}_i}{\bar{Y}_i}. \quad (6)$$

The left hand side is the life satisfaction loss from unemployment. The first term on the right hand side is the gain in life satisfaction from the compensation through the impact of the transitory income component. The second term depicts the satisfaction effect arising from the change in permanent income induced by the temporary compensation.

Outside the unemployment spell, the positive well-being effect of the increased permanent income has to be countered by a negative compensation  $\kappa_E$ , which brings the level of well-being back to that of a continuously employed person:



$$0 = \beta_1 \kappa_E + \beta_2 \frac{\Delta \bar{Y}_i}{\bar{Y}_i}. \quad (7)$$

The change in permanent income induced by the compensation scheme  $(\kappa_{UE}, \kappa_E)$  can be approximated by

$$\frac{\Delta \bar{Y}_i}{\bar{Y}_i} = \frac{\tau}{h} \kappa_{UE} + \frac{h - \tau}{h} \kappa_E, \quad (8)$$

where  $\tau$  denotes the length of the unemployment spell, and  $h$  stands for the individual's time horizon during which the increase in permanent income is effective for well-being.<sup>6</sup> The “net” compensation  $\kappa$  is then approximated by<sup>7</sup>

$$\kappa = \kappa_{UE} + \frac{(h - \tau)}{\tau} \kappa_E. \quad (9)$$

Solving the system of equations (6)-(9) yields:

$$\kappa = \frac{\beta_3}{\beta_1 + \beta_2}. \quad (10)$$

The necessary compensation is obtained by dividing the unemployment coefficient by the sum of the coefficients of transitory and permanent income. Intuitively, one can obtain the same result by directly interpreting the coefficients as marginal changes in life satisfaction, and simply adding up the impact of a temporary compensation in the different time periods. If transitory income is raised by  $\kappa$  percent for a time length  $\tau$ , permanent income rises by  $(1/h)\kappa\tau$  percent. Its impact on well-being during unemployment (time length  $\tau$ ) is then given by  $\beta_1 \kappa + \beta_2(1/h)\kappa\tau$ . Since the rise in permanent income raises happiness over the entire horizon, well-being at all other times in life (length  $h - \tau$ ) also increases by  $\beta_2(1/h)\kappa\tau$ . Adding the two effects, a temporary compensation by  $\kappa$  percent during an interval  $\tau$  raises lifetime well-being by  $(\beta_1 + \beta_2)\kappa\tau$ . To balance this with the loss of well-being from unemployment ( $\beta_3\tau$ ), equation (10) can be used to evaluate the non-pecuniary costs of unemployment under consideration of permanent income effects.

<sup>6</sup> For the time horizon  $h$ , one could assume that a person anticipates the monetary compensation in case of unemployment, so that the increase in permanent income is effective for well-being over the entire lifetime ( $h$  equals life expectancy). Alternatively, one could also assume that people realize the increase in permanent income only from the point of time onwards at which they become unemployed and receive the compensation. In this case, the time horizon  $h$  comprises the remaining lifetime after entering unemployment. The consumption-relevant permanent income rises as given by (8) because the individual will spread the compensation only over future periods.

<sup>7</sup> Equations (8) and (9) yield exact results, rather than approximations, if the transitory income component is constant over time.

Life Satisfaction	Share	Observations
0 – completely dissatisfied	0.5	697
1	0.4	615
2	1.3	1928
3	2.8	4353
4	3.9	5958
5	12.8	19512
6	12.0	18231
7	23.1	35211
8	29.4	44888
9	10.0	15250
10 - completely satisfied	3.8	5768
Total	100.0	152411
Average Life Satisfaction		6.88

Source: GSOEP, own calculations.

*Table 1: Distribution of life satisfaction in Germany (1992-2005)*

### 3. Data

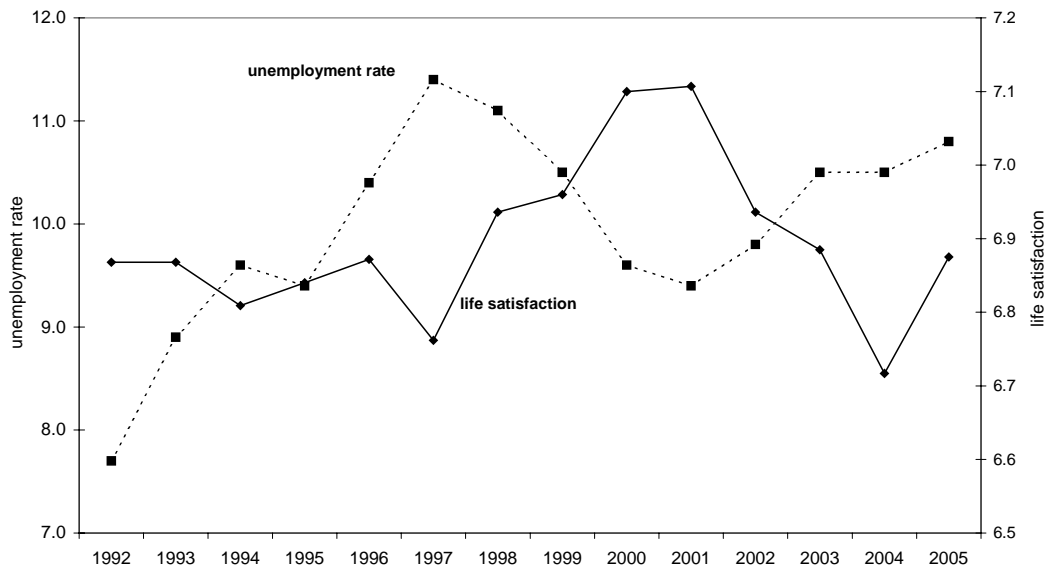
Our empirical analysis is based on the German Socio-Economic Panel (GSOEP).<sup>8</sup> We use the period from 1992 to 2005 to include former East German households. We only consider working age individuals between ages 21 and 64. This gives us 152,411 observations. The great advantage of the GSOEP lies in its panel structure, which allows us to follow individuals over several years and thus to calculate a measure of permanent income.

To extract information on individual life satisfaction, the GSOEP questionnaire asks the following question:

*“In conclusion, we would like to ask you about your satisfaction with your life in general. Please answer according to the following scale: 0 means ‘completely dissatisfied’, 10 means ‘completely satisfied’. How satisfied are you with your life, all things considered?”*

We start with the descriptive statistics of the data. Table 1 shows the distribution of life satisfaction levels for the examined period. The average level of life satisfaction in Germany lies in the upper half of the scale (6.88). Only 8.9 percent of all persons report a life satisfaction value in the lower half of the scale (strictly less than 5), whereas 78.3 percent locate themselves in the upper half (6 and above).

<sup>8</sup> The data used in this publication were made available by the German Socio-Economic Panel Study (GSOEP) at the German Institute for Economic Research (DIW), Berlin.

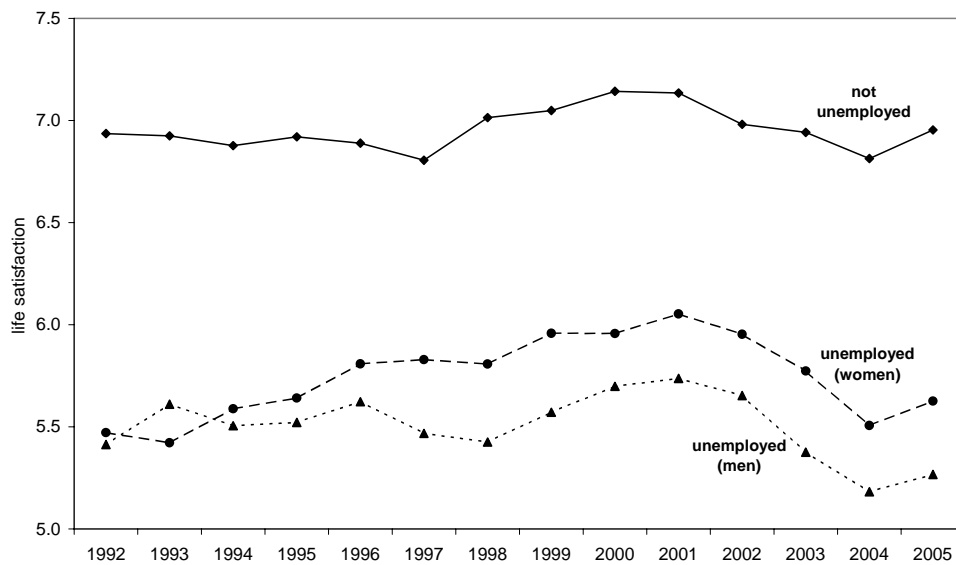


Source: GSOEP, German Federal Labor Office.

Note: The unemployment rate in 2005 is adjusted for one-off statistical effects associated with merging different welfare programs.

Figure 1: Average life satisfaction and unemployment in Germany

The strong relationship between unemployment and life satisfaction is illustrated by Figure 1. The graphs show that the unemployment rate and average life satisfaction generally move in opposite directions. Higher unemployment reduces average life satisfaction across the entire population.



Source: GSOEP, own calculations.

Figure 2: Life satisfaction according to employment status

Figure 2 complements this finding by looking at individual differences in life satisfaction between employed and unemployed persons.<sup>9</sup> Average life satisfaction of unemployed persons is, on average, two points lower than that of employed persons. Furthermore, the well-being of women seems to be reduced less by unemployment than men's well-being does.

#### 4. Results

The descriptive statistics in the preceding section allow only an overview of the psychological impact of unemployment. To obtain a detailed analysis, one has to apply multiple regression methods to control for various other influential factors.

Table 2 shows the results from an ordered probit estimation for both sexes, men only and women only. Columns 1, 3, and 5 represent the respective results obtained by the standard, truncated specification. Columns 2, 4, and 6 contain the respective results from our extended model discussed in Section 3.

##### *Employment status*

The unemployment coefficient for men and women is negative and significant with a value of -0.520 (both sexes).<sup>10</sup> This is the strongest effect of all explanatory variables and clearly shows the negative impact of unemployment. Happiness levels between short- und long-term unemployed persons are not significantly different. Hence, our results do not contain evidence for habituation to unemployment. Part-time employed men have a smaller level of life satisfaction than full-time employed men, while this effect is absent for women. Self-employment significantly reduces happiness. An interesting result is provided by public job creation schemes for the unemployed. The happiness effect of taking part in such a scheme is strongly negative compared to being full-time employed. Its coefficient, however, is much weaker than the unemployment coefficient. This means that unemployed persons are happier if they are placed in a public job creation scheme than if they are forced into inactivity. They are, however, much less happy than people (with the same income) in regular employment.

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<sup>9</sup> Figure 2 does not distinguish between the life satisfaction of employed men and women because both are almost identical during the time period examined.

<sup>10</sup> The reference categories are "full-time employment" and family status "single".

	<u>both sexes</u>		<u>men only</u>		<u>women only</u>	
	(1) truncated	(2) extended	(3) truncated	(4) extended	(5) truncated	(6) extended
employment status (reference: full-time employed)						
unemployed	-0.520** (0.016)	-0.520** (0.016)	-0.621** (0.022)	-0.625** (0.022)	-0.428** (0.023)	-0.425** (0.023)
+ long-term unemployed	0.013 (0.020)	0.017 (0.020)	0.010 (0.029)	0.013 (0.029)	0.016 (0.028)	0.018 (0.028)
part-time	-0.017 (0.013)	-0.019 (0.013)	-0.010** (0.031)	-0.106** (0.032)	0.004 (0.016)	0.005 (0.016)
self-employed	-0.083** (0.019)	-0.090** (0.020)	-0.120** (0.024)	-0.129** (0.024)	-0.012 (0.031)	-0.002** (0.031)
public job creation	-0.301** (0.038)	-0.286** (0.037)	-0.394** (0.055)	-0.384** (0.054)	-0.228** (0.052)	-0.202** (0.052)
other employment	-0.061** (0.020)	-0.071** (0.020)	-0.077* (0.030)	-0.086** (0.030)	-0.059* (0.029)	-0.066* (0.029)
out of labor force	0.002 (0.012)	-0.004 (0.012)	-0.126** (0.021)	-0.132** (0.020)	0.057** (0.017)	0.052** (0.017)
income						
ln(transitory income)	0.443** (0.011)	0.338** (0.012)	0.448** (0.015)	0.346** (0.018)	0.437** (0.015)	0.327** (0.017)
ln(permanent income)		0.355** (0.019)		0.328** (0.028)		0.394** (0.028)
family status (reference: single)						
living with a partner	0.277** (0.016)	0.287** (0.016)	0.247** (0.021)	0.026** (0.021)	0.283** (0.025)	0.290** (0.026)
married	0.381** (0.019)	0.404** (0.019)	0.370** (0.025)	0.396** (0.026)	0.343** (0.028)	0.361** (0.029)
married, but separated	-0.232** (0.036)	-0.206** (0.036)	-0.485** (0.054)	-0.436** (0.055)	-0.101* (0.049)	-0.094 (0.050)
divorced	-0.055 (0.028)	-0.034 (0.029)	-0.125** (0.042)	-0.107* (0.042)	-0.033 (0.039)	-0.015 (0.040)
widowed	-0.145** (0.040)	-0.121** (0.029)	-0.290** (0.084)	-0.261** (0.085)	0.147** (0.050)	-0.132** (0.049)
other variables						
age	-0.053** (0.003)	-0.055** (0.003)	-0.068** (0.005)	-0.070** (0.005)	-0.043** (0.005)	-0.045** (0.005)
age <sup>2</sup>	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)
number of children	0.088** (0.006)	0.099** (0.006)	0.099** (0.009)	0.104** (0.009)	0.068** (0.009)	0.082** (0.009)
years of education	-0.001 (0.002)	-0.012** (0.003)	0.015 (0.003)	-0.007* (0.003)	-0.002 (0.004)	-0.016** (0.004)
house ownership	0.134** (0.010)	0.124** (0.010)	0.135** (0.014)	0.127** (0.014)	0.140** (0.014)	0.128** (0.014)
relative in need of care	-0.261** (0.024)	-0.252** (0.023)	-0.235** (0.034)	-0.225** (0.034)	-0.287** (0.003)	-0.280** (0.033)
health	0.480** (0.005)	0.479** (0.005)	0.496** (0.007)	0.495** (0.007)	0.463** (0.006)	0.463** (0.006)
log likelihood	-232764	-232598	-112673	-112602	-119848	-119749
observations	143246	143246	70064	70064	73182	73182

Note: Ordered probit estimation with individual random effects and time fixed effects. Standard deviations in parentheses. For expositional reasons, the cut-offs are not reported. \* denotes significance at the 5-percent-level, \*\* at the 1-percent-level.

Table 2: Regression results for life satisfaction

Another important result concerns the life satisfaction of people who do not participate in the labor market (out of labor force). The happiness of non-participants differs only slightly from the life satisfaction of full-time employed persons (lower for men, larger for women). It does, however, differ strongly from the life satisfaction of unemployed people. This suggests that unemployment and non-participation are two distinct labor market states, and that unemployment is mainly involuntary.

Looking at the gender-specific results, one notices a difference between men and women in the negative influence of unemployment on life satisfaction. The main insight of Figure 2, that men are more affected by unemployment than women are, is also supported after controlling for various other factors. The impact of part-time employment, public job creation schemes, and non-participation are more pronounced for men than for women.

To sum up, unemployment has a significantly negative effect on individual life satisfaction. Men suffer even more from a job loss than women.

### *Income*

The income coefficients have the expected positive sign, i.e. an increase in the transitory as well as in the permanent income component increases an individual's current life satisfaction. The transitory income coefficient is 0.338, that of permanent income 0.355. Since both coefficients have about the same size, a permanent rise in income, which increases both transitory and permanent income by the same rate, has about twice the effect on current well-being compared to a temporary increase in income that leaves permanent income unaffected. The results support the suspected misspecification of the truncated model. Without controlling for permanent income, the impact of current income is overestimated (0.443) because part of the effect that actually belongs to permanent income is spuriously assigned to current income.

### *Other variables*

Living with a partner as well as being married both have a strong, positive influence on life satisfaction. Previous studies have pointed out the positive effect of marriage (see Clark and Oswald 1994, Diener et al. 2000). Our findings suggest, however, that it is in fact living in a steady relationship what makes people happier. The magnitude of the coefficient is similar for men and women. There is, however, a strong discrepancy for the other family status variables. Separation, divorce, and death of a partner have the expected negative signs, but have a much stronger effect on men than on women.

Age affects mental well-being non-monotonically. It reaches its trough at age 43 and increases afterwards. Controlling for income and employment status, it becomes apparent that a person's education does not have a significant effect on his life satisfaction. House ownership,

which is often associated with deeper roots in one's social environment, affects life satisfaction positively. Caring for a relative in the household has the expected negative sign. One's own health, as measured on a scale from 1 (very bad) to 4 (very good), is second only to unemployment in the size of its effect on life satisfaction.

### 5. Quantifying the non-pecuniary costs of unemployment

To quantify the non-pecuniary costs of unemployment, one calculates the hypothetical income compensation necessary to restore the level of life satisfaction lost due to unemployment.

The standard quantification method based on the truncated model (without distinguishing between transitory and permanent income changes) has been described in equation (5). Comparing the coefficients of unemployment and income yields a required compensation of  $0.520/0.443 = 117.4$  percent to restore the loss in life satisfaction. For men, the required compensation is 138.6 percent, for women 97.9 percent.<sup>11</sup>

As explained in Section 3, these results are distorted due to the misspecification of the truncated model. To use the extended model for quantifying the non-pecuniary costs of unemployment, we revert to the estimation results from Table 2, Columns 2, 4, and 6, and to equations (10).

In the extended model, the required compensation amounts to 75.0 percent of income. This value is considerably lower than the 117.4 percent from the truncated model because the truncated model ignores that a temporary compensation also raises a person's permanent income and causes additional favorable effects outside the unemployment spell. When these additional positive effects are taken into account, a much smaller compensation suffices to counter the satisfaction loss from unemployment. If one analyzes men and women separately, one obtains the same qualitative results. Men need a compensation of 92.7 percent (138.6 percent

	both sexes	men only	women only
truncated model	117.4%	138.6%	97.9%
extended model	75.0%	92.7%	58.9%

*Note: The values are expressed relative to individual income.*

*Table 3: Non-pecuniary costs of unemployment*

<sup>11</sup> An identical method has been used by Winkelmann and Winkelmann (1995, 1998) and Blanchflower and Oswald (2004). Winkelmann and Winkelmann (1995), who use data from the 1980s, obtain even larger values for men (277 percent), but smaller values for women (80 percent).

in the truncated model), and women of 58.9 percent (97.9 percent in the truncated model), for the loss of their job.

Table 3 summarizes all the results. The findings show that neglecting permanent income causes a considerable overestimation of the non-pecuniary costs of unemployment. The estimates obtained from the extended model are consistently at about two-thirds their level in the truncated model.

Nevertheless, even in the extended model the non-pecuniary costs of unemployment are still very large. Assuming that unemployment is typically associated with an individual income loss of 40 percent,<sup>12</sup> the total costs of unemployment can be divided into 70 percent non-pecuniary and 30 percent pecuniary costs for men, while for women the costs are 60 percent non-pecuniary and 40 percent pecuniary. Hence, as a rule of thumb the total costs of unemployment an individual experiences are composed of about two-thirds non-pecuniary and one-third pecuniary costs. In other words, even though unemployed persons experience an income loss of only about 40 percent of their previous income, taking into account the psychological costs of unemployment shows that the full individual costs of unemployment are almost three times as large as suggested by the income loss only.

## 6. Conclusion

Employment plays a central role in human happiness. It not only allows the satisfaction of material needs through income generation, but also offers immaterial, non-pecuniary benefits for life satisfaction. To quantify these costs, subjective well-being data from social surveys can be used to calculate the additional income an individual would require to be compensated for the loss in life satisfaction associated with being unemployed.

The standard method of calculating such income compensations using the life satisfaction approach, however, is flawed because it neglects the intertemporal spillover effects of temporary income compensations. When a person receives additional income, he spreads part of it over his entire lifetime to smooth his consumption path. This consumption smoothing also causes higher life satisfaction outside the time period in which a person's income is actually raised. Since the standard method limits its attention to the period in which unemployment occurs, it ignores the positive effect of the income compensation on life satisfaction in other time periods. Hence, it systematically underestimates income's impact on total life satisfaction and thus overestimates the necessary income compensation for unemployment.

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<sup>12</sup> The other 60 percent are typically replaced by the unemployment insurance, welfare benefits etc. (see Winkelmann and Winkelmann 1995).



In this paper, we develop a modified monetary equivalence measure for the non-pecuniary costs of unemployment. Following Friedman's (1957) permanent income hypothesis, we distinguish between temporary and permanent income changes, which enables us to capture the intertemporal happiness spillovers of temporary income compensations. This avoids the overestimation bias of the standard method. Our results are more cautious than those derived by previous studies (Winkelmann and Winkelmann 1995, 1998, Blanchflower and Oswald 2004), and reduce the estimated non-pecuniary costs of unemployment by roughly one-third. Nevertheless, we find that unemployment drastically reduces life satisfaction even if the income loss would be fully compensated. For men, the non-pecuniary cost of unemployment are about the same magnitude as their previous income and are thus more than twice as large as the income loss due to unemployment. For women, the data show substantially lower non-pecuniary cost. For them, the sum of the pecuniary and non-pecuniary cost of unemployment is of the same magnitude as previous income. Thus, taking the non-pecuniary, psychological costs of unemployment into account shows that the full individual costs of unemployment are almost three times as large as its pecuniary costs only.

The results have clear methodological as well as policy implications. With respect to methodology, our results carry over to quantifying the value of any non-marketable good. For example, the life-satisfaction approach has been applied to determine the value of pollution (Welsch 2002), noise exposure (van Praag and Baarsma 2005), terrorism (Frey et al. 2004), and climatic differences (Rehdanz and Maddison 2005). We have shown that the standard method applied in these studies generally overestimates the monetarized value of these goods. To avoid this systematic bias, a measure of permanent income should always be included to account for the positive intertemporal effects of income compensations.

With respect to policy, even our more cautious method shows that the true costs of unemployment are much higher than suggested by pure individual income losses. Measuring the cost of unemployment only by the income losses of the unemployed significantly underestimates the true cost of unemployment since the non-pecuniary costs are much higher than the pecuniary cost. The generous alimentionation through passive labor market policies thus does not suffice to really compensate the unemployed for their job losses. Instead, our results strengthen the case for active labor market policies that quickly bring people back into employment.

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