

Knabe, Andreas; Rätzel, Steffen

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# Income, happiness, and the disutility of labor

Andreas Knabe  
Steffen Rätzel

School of Business & Economics

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# Income, happiness, and the disutility of labor

**Andreas Knabe**<sup>\*</sup>

Freie Universität Berlin and CESifo

**Steffen Rätzel**<sup>\*\*</sup>

Otto-von-Guericke-University Magdeburg

## Abstract

We reexamine the claim that the effect of income on subjective well-being suffers from a systematic downward bias if one ignores that higher income is typically associated with more work effort. We analyze this claim using German panel data, controlling for individual unobserved heterogeneity, and specifying the impact of working hours in a non-monotonic form. Our results suggest that the impact of working hours on happiness is rather small and exhibits an inverse U-shape. We do not find evidence that leaving working hours out of the analysis leads to an underestimation of the income effect.

JEL classification: D60, I31

Keywords: happiness, life satisfaction, income, disutility of labor

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<sup>\*</sup> Freie Universität Berlin, Boltzmannstr. 20, 14195 Berlin, Germany. Tel.: +49-30-83851241. E-mail: [Andreas.Knabe@fu-berlin.de](mailto:Andreas.Knabe@fu-berlin.de).

<sup>\*\*</sup> Otto-von-Guericke-University Magdeburg, Faculty of Economics and Management, P.O. Box 4120, 39016 Magdeburg, Germany. Tel.: +49-0391-67-12158. E-mail: [Steffen.Raetzel@ovgu.de](mailto:Steffen.Raetzel@ovgu.de).

## 1. Introduction

Does income make people happy, and if so, how much extra happiness does a person experience if his income rises? While this is (and certainly remains) one of the hot topics in the Economics of Happiness, there is an emerging consensus that the impact of income on a person's subjective well-being is positive, statistically significant, but quantitatively rather small. Supportive evidence for this finding is provided by, e.g., Blanchflower and Oswald (2004), Frey and Stutzer (2002), Luttmer (2005), Winkelmann and Winkelmann (1998), and van Praag and Ferrer-i-Carbonell (2004). A recent survey is provided by Clark et al. (2008).

To isolate the true effect of income on happiness, however, it is necessary to control for any negative influences associated with the process of earning more money. One factor that potentially counteracts the positive effect of income is that earning more money typically requires additional work efforts – the so-called “disutility of labor”. If one wants to work for one more hour, one has to give up one hour of leisure time. When thinking about money, people often seem to focus only on its benefits but neglect its costs. As Kahneman et al. (2006) put it:

“When someone reflects on how additional income would change subjective well-being, they are probably tempted to think about spending more time in leisurely pursuits such as watching a largescreen plasma TV or playing golf, but in reality they should think of spending a lot more time working and commuting [...] By itself, this shift in time use is unlikely to lead to much increase in experienced happiness.” (p. 1910)

Estimations of the effect of income on happiness typically ignore this cost side of income and run regressions without controlling for hours of work. The income effect obtained from such regressions reflects the sum of the proper positive income effect and the effect of increased working hours. If working hours have a negative effect on well-being, this combined effect underestimates the true effect of income. To isolate the true effect of income on happiness, one has to control for the impact of working hours explicitly. Pouwels et al. (2008) provide such an analysis. In their study, they use the 1999 wave of the German Socio-Economic Panel (GSOEP) and consider a subsample of married and cohabiting couples of which both partners were between 18 and 65 years of age and were not unemployed, disabled or retired. Their results support the hypothesis that the basic model tends to underestimate the effect of income on happiness. For men (women), this study finds that the underestimation amounts to 25 (12) percent.

Our paper closely relates to the study by Pouwels et al. (2008), but extends it in three important aspects. First, while Pouwels et al. (2008) restrict their analysis to a cross-section for the year 1999, we include eight subsequent waves of the GSOEP (1999-2006). This expands the available sample from roughly 1,300 to almost 17,000 observations. Second, once we include multiple waves of the GSOEP, its panel structure allows us to control for individual unobserved heterogeneity. Taking individual fixed effects into account is extremely important when analyzing subjective well-being data. Lykken and Tellegen (1996) provide evidence that up to 80 percent of the well-being variation is influenced by individual genes and personal traits. Ferrer-i-Carbonell and Frijters (2004) also show the importance of time-invariant individual-specific effects in explaining happiness. Third, we apply a more flexible specification how working hours affect subjective well-being. Pouwels et al. (2008) assume that this impact can be represented by a log-linear regression specification. This implies that the disutility of an additional working hour is large if the number of hours already worked is small, but that the negative impact of an additional hour of work diminishes as the number of working hours increases. In our analysis, we use a more flexible, quadratic specification. This has diminishing marginal disutility of labor as one of its special cases, but also allows for the (perhaps more plausible) case that hours of work exert increasing marginal disutility. Indeed, we find that working hours have an inversely U-shaped impact on well-being, but that the magnitude of its impact is rather small. Using our new methodology the results suggest that there is no evidence that controlling for the disutility of labor increases the impact of income on happiness.

The paper is structured as follows. In the next section, we present the data and estimation methodology. Section 3 contains our results. Section 4 concludes.

## **2. Data and Methodology**

We use the German Socio-Economic Panel (GSOEP) for the years from 1999 to 2006.<sup>1</sup> Following Pouwels et al. (2008), we include all working age cohabiting couples and married people between ages 18 and 65 that are active in the labor force. This yields an unbalanced panel with roughly 17,000 observations. The subjective well-being data are generated from a question in the GSOEP that asks respondents: “How satisfied are you with your life, all things considered?” The answer to this question runs from 0 (completely dissatisfied) to 10 (completely satisfied).

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<sup>1</sup> The data were made available by the German Socio-Economic Panel Study (GSOEP) at the German Institute for Economic Research (DIW), Berlin, and were extracted using the Add-On-package PanelWhiz for Stata (see Haisken-DeNew and Hahn (2006) for details).

In a first step, we reproduce the regression specification of Pouwels et al. (2008) with our extended dataset. We run an ordered probit model on the pooled cross-section and estimate the following equation:

$$LS_{it} = \beta_1 \ln Y_{it} + \beta_2 \ln Y_{it}^P + \beta_3 (\ln Y_{it} \cdot \ln Y_{it}^P) + \beta_4 \ln L_{it} + \beta_5 \ln age_{it} + \beta_6 H_{it} + \beta_7 H_{it}^P + \varepsilon_{it}, \quad (1)$$

where  $Y_{it}$  is the net annual labor income of individual  $i$  in year  $t$ . Specification (1) also includes the income of the partner  $Y_{it}^P$  and an interaction term of both incomes.  $L_{it}$  is the number of weekly paid working hours including overtime,  $age_{it}$  is a person's age,  $H_{it}$  and  $H_{it}^P$  are a self-rated measures of health ranging from 1 (bad) to 5 (very good), and  $\varepsilon_{it}$  is a random error term. Following Pouwels et al. (2008), we first estimate a basic model (with  $\beta_4 = 0$ ) and then an extended model (where we estimate the value of  $\beta_4$ ).

In a second specification, we check whether these results are robust to including individual fixed effects and allowing for a more general specification of the influence of working hours on life satisfaction. Our estimation equation thus becomes

$$LS_{it} = \beta_1 \ln Y_{it} + \beta_2 \ln Y_{it}^P + \beta_3 (\ln Y_{it} \cdot \ln Y_{it}^P) + \beta_4 L_{it} + \beta_5 L_{it}^2 + \beta_6 \ln age_{it} + \beta_7 H_{it} + \beta_8 H_{it}^P + \nu_i + \mu_t + \varepsilon_{it}, \quad (2)$$

where  $\nu_i$  is an individual-specific effect and  $\mu_t$  is a time dummy. To take into account the ordinal character of the dependent variable, we run a Probit-adjusted OLS (see van Praag and Ferrer-i-Carbonell (2004) for details).<sup>2</sup> The advantage of this method lies in the possibility to include individual fixed effects without having to dichotomize the dependent variable. The most important change in specification (2), however, concerns the substitution of log weekly paid working hours by weekly paid working hours,  $L_{it}$ , and weekly paid working hours squared,  $L_{it}^2$ . As above, we first estimate the model without working hours and then include labor time as a regressor.

### 3. Empirical results

We first replicate the findings of Pouwels et al. (2008) by running an ordered probit regression on the pooled cross-section. The results are shown in Table 1. Income has a positive influence, whereas working hours exert a negative well-being effect. When we compare the basic model (columns 1 and 3) with the extended model (columns 2 and 4), we see that the basic model tends to underestimate the income effect on happiness. The income coefficient for men rises by about 39 percent, and the difference is significant at the 1 percent

<sup>2</sup> We also conducted conditional fixed-effect logit as well as standard fixed-effects OLS estimations for robustness checks. These regressions gave identical results. The results can be obtained from the authors.

level. For women, the bias seems to be much weaker. The income effect rises only by 1 percent, and the difference between the two coefficients is not significant. All other coefficients are similar to the results in Pouwels et al. (2008).

|                                | Basic model<br>Women<br>(1) | Extended model<br>Women<br>(2) | Basic model<br>Men<br>(3) | Extended model<br>Men<br>(4) |
|--------------------------------|-----------------------------|--------------------------------|---------------------------|------------------------------|
| <b>Income</b>                  |                             |                                |                           |                              |
| Log net yearly income<br>woman | 0.659***<br>(0.242)         | 0.665***<br>(0.242)            | 0.107<br>(0.242)          | 0.167<br>(0.243)             |
| Log net yearly income<br>man   | 0.849***<br>(0.224)         | 0.709***<br>(0.225)            | 0.373*<br>(0.225)         | 0.518**<br>(0.225)           |
| Interaction term               | -0.064***<br>(0.024)        | -0.052**<br>(0.024)            | -0.008<br>(0.024)         | -0.013<br>(0.024)            |
| Log weekly working hours       |                             | -0.188***<br>(0.024)           |                           | -0.369***<br>(0.037)         |
| Log age                        | 0.192***<br>(0.036)         | 0.171***<br>(0.036)            | 0.239***<br>(0.038)       | 0.182***<br>(0.038)          |
| <b>Health</b>                  |                             |                                |                           |                              |
| Health woman                   | 0.509***<br>(0.011)         | 0.507***<br>(0.011)            | 0.178***<br>(0.010)       | 0.175***<br>(0.01)           |
| Health man                     | 0.181***<br>(0.01)          | 0.181***<br>(0.019)            | 0.542***<br>(0.011)       | 0.541***<br>(0.011)          |
| Individual fixed effects       | No                          | No                             | No                        | No                           |
| Time fixed effects (annual)    | No                          | No                             | No                        | No                           |
| R <sup>2</sup>                 | -28,201                     | -28,170                        | -27,758                   | -27,708                      |
| Observations                   | 16,937                      | 16,937                         | 16,937                    | 16,937                       |

Note: Standard errors in parentheses. \*, \*\*, \*\*\* denotes significance at the 10, 5, and 1 percent level, resp.

Table 1: Regression result (Pooled Ordered Probit)

When we control for individual fixed effects and specify the impact of working hours in a quadratic form, a different picture emerges (Table 2). Income still has a positive influence on happiness, but working hours do not have a strictly negative effect anymore. If anything, working time influences well-being in an inverse U-shaped manner. An increase in working hours raises well-being for the first hours and exerts marginal disutility only if a person has already worked a large number of hours. The general magnitude of the impact of working hours on happiness is, however, rather small and the coefficients are not significantly different from zero. This suggests that the increase in working hours, at least up to some point, should not be considered the “cost side” of earning a higher income. Instead, more

working hours could also be associated with other positive factors such as higher employment status, more social contacts at work etc.<sup>3</sup>

|                                 | Basic model<br>Women<br>(1) | Extended model<br>Women<br>(2) | Basic model<br>Men<br>(3) | Extended model<br>Men<br>(4) |
|---------------------------------|-----------------------------|--------------------------------|---------------------------|------------------------------|
| <b>Income</b>                   |                             |                                |                           |                              |
| Log net yearly income<br>woman  | 0.311<br>(0.395)            | 0.307<br>(0.396)               | 0.493<br>(0.375)          | 0.491<br>(0.376)             |
| Log net yearly income<br>man    | 0.383<br>(0.37)             | 0.386<br>(0.371)               | 0.669*<br>(0.353)         | 0.666*<br>(0.353)            |
| Interaction term                | -0.027<br>(0.040)           | -0.028<br>(0.040)              | -0.047<br>(0.038)         | -0.046<br>(0.038)            |
| Weekly working hours            |                             | 0.002<br>(0.003)               |                           | 0.002<br>(0.005)             |
| Weekly working hours<br>squared |                             | -0.000<br>(0.000)              |                           | -0.000<br>(0.000)            |
| Log age                         | -0.685<br>(0.530)           | -0.671<br>(0.531)              | -1.118**<br>(0.561)       | -1.119**<br>(0.561)          |
| <b>Health</b>                   |                             |                                |                           |                              |
| Health woman                    | 0.247***<br>(0.010)         | 0.247***<br>(0.010)            | 0.068***<br>(0.010)       | 0.068***<br>(0.010)          |
| Health man                      | 0.060***<br>(0.011)         | 0.060***<br>(0.011)            | 0.250***<br>(0.010)       | 0.250***<br>(0.010)          |
| Individual fixed effects        | Yes                         | Yes                            | Yes                       | Yes                          |
| Time fixed effects (annual)     | Yes                         | Yes                            | Yes                       | Yes                          |
| Log Likelihood                  | -13,288                     | -13,288                        | -14,035                   | -14,035                      |
| Observations                    | 16,937                      | 16,937                         | 16,937                    | 16,937                       |

Note: Standard errors in parentheses. \*, \*\*, \*\*\* denotes significance at the 10, 5, and 1 percent level, resp.

Table 2: Regression result (Probit-adjusted OLS with fixed effects)

If working hours do not generate disutility, however, leaving them out of the regression should not cause a negative bias for the income coefficient. The findings in Table 2 provide supportive evidence that the income coefficient is indeed not affected by including working hours. When comparing the basic with the extended model for men and women, the differences between the income coefficients are not significant (and even have the opposite sign). Hence, after controlling for fixed effects and the non-monotonic influence of working hours, we do not find supportive evidence for the claim by Pouwels et al. (2008) that leaving working hours out of the analysis tends to underestimate the effect of income on happiness.

<sup>3</sup> The result that working hours does not influence well-being negatively is supported by other recently published papers e. g. Meier and Stutzer (2007) or Booth and van Ours (2008).



## 4. Conclusion

In this paper, we reexamined the claim the neglecting the impact of working hours on happiness causes a downward bias in the income-happiness-relationship. Pouwels et al. (2008), using cross-sectional data for Germany, found that controlling for working hours would substantially increase the impact of income on subjective well-being. Replicating their methodology, we find similar results. When we extend the analysis, however, the results change considerably. Our extensions include (1) broadening the dataset to a panel of eight years, (2) controlling for individual unobserved heterogeneity by including fixed effects, and (3) specifying the impact of working hours in a more flexible, quadratic form that allows for non-monotonic influences. With these extensions, our results suggest that the impact of working hours on happiness is rather small and exhibits an inverse U-shape. Since the magnitude of the hours effect is small, there is no evidence that leaving working hours out of the analysis leads to an underestimation of the income effect.

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