

Goerke, Laszlo; Pannenberg, Markus

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Keeping up with the Joneses: Income Comparisons and Labour Supply*

Laszlo Goerke

IAAEU – University of Trier ⁺, IZA, Bonn and CESifo, München

⁺ Institute for Labor Law and Industrial Relations in the European Union, Campus II
D – 54286 Trier, Germany
E-mail: goerke(at)iaaeu.de

&

Markus Pannenberg

University of Applied Sciences Bielefeld⁺⁺, DIW, Berlin and IZA, Bonn

⁺⁺ Department of Business and Economics
Universitätsstraße 25
D-33615 Bielefeld, Germany
E-mail: Markus.Pannenberg(at)fh-bielefeld.de

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Abstract

We investigate whether working time is related to the intensity of income comparisons and relative income. Our simple theoretical model demonstrates that the effects of relative income concerns depend on whether an individual can choose contractual working hours and/or overtime. In the empirical analysis we rely on novel data from the German Socio-Economic Panel (SOEP), which contains direct information on comparison intensity and perceived relative income with respect to predetermined reference groups. In line with our theoretical model we find that overtime rises with the intensity with which respondents compare their income to that of other individuals of the same occupation and that overtime declines with perceived relative income. This is consistent with 'Keeping up with the Joneses' preferences.

JEL Classification: D 62, J 22, Z 13

Keywords: Cross-Survey Multiple Imputation, Endogenous Reference Group, German Socio-Economic Panel (SOEP), Labour Supply, Overtime, Social Preferences, Working Time

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1. Introduction

Substantial evidence supports the view that subjective well-being is strongly influenced by relative income (e.g. Senik 2005, 2009, Clark, Frijters and Shields 2008). Much less attention has been devoted to the empirical analysis of how income comparisons affect actual behaviour. This seems to be a potentially important omission because policy proposals may be misguided if focussing only on the income comparison effect (Clark, forthcoming). Suppose, for example, that people relate their income to that of others and derive utility from higher relative income. In consequence, there will be a negative externality resulting from additional hours of work because other individuals who also derive utility from income comparisons are made worse off, *ceteris paribus* (cf. Frank 1985). The income externality can be called upon, for example, to justify (progressive) income taxes.¹ However, such policy advice may be misguided if individuals also derive utility from having more spare time than others. The resulting leisure externality will tend to reduce the required income tax rate or may even justify an employment subsidy. Therefore, it seems to be of utmost importance to enquire whether not only subjective well-being but also the actions of individuals, namely the choice of working time, are affected by relative income concerns. If working time rises with the strength of such considerations, the income externality dominates a possible leisure effect and, for example, provides a justification for the taxation of labour income.

In this paper, we investigate the relationship between labour supply behaviour and income comparisons. Such association has been derived in various theoretical settings, but has only been looked at in few empirical studies thus far. Neumark and Postlewaite (1998) show that the employment rate of women is higher if either the sister-in-law is employed or the sister's husband has a higher income than the own spouse. Park (2010) finds that female labour force participation rises with various indicators of relative income, which the researcher characterises in terms of geographical proximity, race and age. Pérez-Asenjo (2011) defines reference groups with respect to age, gender, race, and religion. Hours of work, the probability to work full-time instead of part-time, and labour force participation decline with relative income. Depending on the reference group chosen, a fall in relative income by 10% raises labour supply in the range of five to ten minutes and at most by half an hour per week (Pérez-Asenjo 2011, Table 5). All of the above mentioned studies relate to the United States, are based on the researcher's own definition of reference groups and focus on labour force

¹ See, for example, Duesenberry (1949), Boskin and Sheshinski (1978), Seidman (1988), Persson (1995), Ireland (1998, 2001), Ljungqvist and Uhlig (2000), Corneo (2002), Layard (2005), Aronsson and Johansson-Stenman (2010), and Dodd (2012).

participation. As a partial exception, Pérez-Asenjo (2011) also considers hours of work.² In a related paper, Card et al. (2012) show that information about colleagues' pay decreases job satisfaction and fosters job turnover of employees who learn to have a low relative income.

Given the scarcity of enquiries relating to the relationship between labour supply and income comparisons, we extend the existing knowledge in three directions: First, we show in a simple theoretical model that the effects of relative income concerns depend on whether an individual can choose contractual working hours and overtime, or only one of them. To the best of our knowledge, this empirically relevant distinction has not been looked at in theoretical analyses, thus far. Second, we can overcome the "important limitation ... that the reference group is defined in a rather ad-hoc way by the researcher" (Ferrer-i-Carbonell forthcoming, p. 10). In order to do so, we use data from the German Socio-economic Panel (SOEP) because in some samples employees themselves report how important they regard income comparisons with respect to nine predetermined reference groups. Hence, we do not have to model endogenous selection into reference groups (cf. Falk and Knell 2004). Additionally, we can utilise information on what the respondents believe their income is, relative to the income of these nine reference groups. This information is desirable since responses to the behaviour of others are most likely to be guided by what individuals believe them to earn, given that the others' true income may not be perfectly observable (e.g. de la Garza, Mastrobuoni, Sannabe, and Yamada 2012). As a third contribution, we show in our empirical investigation that (1) standard or contractual hours of work are not systematically correlated with relative income concerns, (2) comparisons with only one of the nine reference groups are related to overtime choices, namely "people in the same occupation", and (3) those employees work more overtime who compare income more intensively and perceive to have a lower income than their occupational reference group. The effects are quantitatively sizeable and support the view that relative income concerns dominate other types of comparisons.

In the remainder of the paper we present a simple model of individual working time choices in the presence of relative income effects in Section 2. In Section 3, we describe the data and empirical specifications. In Section 4, we present our empirical findings. Finally, Section 5 summarises and puts the results into perspective.

² In a related contribution, Aronsson, Blomquist and Sacklén (1999) look at the impact of average working hours in a reference group defined by the researchers on individual labour supply. Pingle and Mitchell (2002) present individuals with hypothetical combinations of working time and income and find that both the average level of hours worked and average income affect individuals' choices between alternative scenarios.

2. Model

In this section, we will establish the impact of income and leisure comparisons on the two indicators of working time, standard or contractual hours and overtime, for which we have information in our data set. In particular, we set up a simple model of working time choices which combines the supply- and demand-based approaches to the determination of overtime (see Hart, 2004, chap. 3 for an overview).

Set-up

There are a large number of individuals who derive utility, u , from consumption, c , of the sole commodity and leisure. Utility decreases with working time, which is the sum of standard or contractual working hours, h , and overtime, z . Following for example Abel (1990) and Galí (1994), utility additionally depends on the consumption or income, \bar{c} , of a reference group, which is given from an individual's perspective, for example because this group is sufficiently large. In consequence, utility, u , is defined by $u = u(c, \bar{c}, h + z)$, where $u_1 > 0 > u_3$ describe the above restrictions, and subscripts denote partial derivatives. Moreover, the utility function, u , is strictly concave in own income and working time and separable between own consumption, c , and leisure, so that $u_{11}, u_{33} < 0 = u_{13}$ holds.³

A situation in which utility, u , decreases with income of the reference group, \bar{c} , implying that $u_2 < 0$ holds, has been termed jealousy or envy, whereas $u_2 > 0$ has been labelled admiration.⁴ Furthermore, if the marginal rate of substitution between leisure and consumption, u_3/u_1 , increases (decreases) with income of the reference group, \bar{c} , individuals exhibit 'Keeping up with (Running away from) the Joneses' preferences, KUJ (RAJ) for short (cf. Dupor and Liu 2003 and Liu and Turnovsky 2005).

Individual consumption, c , is equivalent to income, since the price of the sole commodity is normalised to unity. Further, income equals (the sum of) earnings, hw , from contractual working hours, h , and $zw(1 + m)$ from overtime, z , where w is the wage per hour and m , $m > 0$, denotes the overtime premium, $c = w(h + z(1 + m))$. Given a positive mark-up, m , individuals would like to only work overtime, unless a value of $z > 0$ also induces a reduction

³ The separability assumption ($u_{13} = 0$) has often been employed in analyses of consumption or income externalities because it substantially simplifies the formal analysis, without imposing too much structure on results (see f. e. Mui 1995, Persson 1995, Corneo 2002, Dupor and Liu 2003, and Dodds 2012).

⁴ See Dupor and Liu (2003) and Eaton and Eswaran (2003). A positive impact of the reference group has also been termed tunnel or signal effect because it can convey information about own future income possibilities (see Senik (2004) for evidence of such effects for Russia). Note, moreover, that our specification is compatible with so-called Fehr-Schmidt (1999) preferences who assume that utility depends on income (instead of consumption), but not on leisure, and that $u_{12} = 0$, while $u_2 < (>) 0$ holds for $c - \bar{c} < (>) 0$.

in utility, in addition to the negative impact on leisure. This negative utility effect of overtime is denoted by $K(z)$, where $K(0) = K'(0) = 0$ and $K'(z > 0), K''(z > 0) > 0$ hold, and captures the idea that overtime will often occur at less convenient times or at short notice. For simplicity, $K(z)$ is separable from (sub-) utility, u .

Summing up all the above information, total utility, U , can be written as:

$$U(h, z) = u(c, \bar{c}, h + z) - K(z) = u(w(h + z(1 + m)), \bar{c}, h + z) - K(z) \quad (1)$$

If the individual is able to choose h and z , working time is entirely supply-determined. Alternatively, we can think of contractual working hours, h , as the component of working time which an individual may only be able to choose optimally in the long-run by changing the job, while z represents the part which can at all times be determined optimally. This may be the case because the employer or a collective bargaining agreement determines contractual working time which was the case for more than 50% of all employees in Germany in 2010 (Ellguth and Kohaut 2011). If, in contrast, the individual cannot select z optimally, overtime will be demand-determined. Furthermore, the interpretation of z is not restricted to paid overtime. Unpaid overtime will not yield a positive mark-up ($m > 0$) in the short-run, but a positive payoff in the longer run, for example, because only those individuals who work unpaid overtime receive higher income later on (e.g. Pannenberg 2005). All these effects are subsumed under the mark-up, m .

Optimal Choices

Assume initially that individuals can choose contractual working hours, h , and overtime, z .

$$\frac{\partial U}{\partial h} := U_h = u_1 w + u_3 = 0 \quad (2a)$$

$$\frac{\partial U}{\partial z} := U_z = u_1 w(1 + m) + u_3 - K'(z) = 0 \quad (2b)$$

These first-order conditions constitute a maximum of U as $U_{hh}, U_{zz} < 0$ and the determinant, D , of (2) is positive, where $D := U_{hh}U_{zz} - (U_{hz})^2 = u_{11}u_{33}w^2m^2 - K''(z)U_{hh}$.

It is worth noting that the sign and magnitude of u_2 are without impact on choices. Consequently, the predominant findings in empirical analyses that subjective well-being rises with relative income (e.g. Ferrer-i-Carbonell 2005, Senik 2005) cannot provide information with respect to the relationship between working time and relative income concerns.

Comparative Statics

The derivatives of the first-order conditions with respect to the reference income, \bar{c} , equal:

$$U_{h\bar{c}} = u_{12}w + u_{23} = U_{z\bar{c}} - u_{12}w m \quad (3)$$

Equation (3) also allow for the analysis of a rise in the strength of relative income concerns. If we specify sub-utility u , for example as $u(c, \bar{c}, \rho, h + z)$, where ρ is an indicator of the intensity of income comparisons, we can investigate the consequences of a marginal rise in the parameter ρ for a given level of \bar{c} . The results are qualitatively the same as those for an increase in \bar{c} . This is important to keep in mind, since we also use self-reported information on the intensity of income comparison in our empirical work.

Taking into account $d(u_3/u_1)/d\bar{c} = (u_{23}u_1 - u_3u_{12})/(u_1)^2$ and substituting for u_3 in accordance with the first-order condition (2a), clarifies that $d(u_3/u_1)/d\bar{c} > (<) 0$ and, hence, KIJ (RAJ) is equivalent to $u_{12}w + u_{23} = U_{h\bar{c}} > (<) 0$. Moreover, only a broader definition of KIJ (RAJ), namely that $d(U_z/u_1)/d\bar{c} > (<) 0$, guarantees that $dz/d\bar{c} > (<) 0$ holds for a given value of contractual hours, h , because of the additional costs of overtime, $K(z)$. Note, further, that if a rise in \bar{c} requires the reference group to work more, $u_{23} > (<) 0$ indicates that the disutility from work becomes less (more) pronounced at the margin when working time of the reference group rises and, thereby, leisure declines. Therefore, $u_{23} > (<) 0$ implies that less leisure consumption by the reference group decreases the individual's incentives to consume leisure and may, hence, be interpreted as indicating conformist (non-conformist) preferences with respect to leisure. If such leisure externalities are absent, $u_{23} = 0$ will hold.⁵

Assuming that the individual is not constrained, the effects of a rise in the reference income, \bar{c} , or of more pronounced relative income concerns on optimal contractual working hours, h^* , and optimal overtime, z^* , are determined by:

$$\frac{dh^*}{d\bar{c}} = \frac{U_{hz}U_{z\bar{c}} - U_{h\bar{c}}U_{zz}}{D} = \frac{wm[u_{12}u_{33} - u_{11}u_{23}w(1 + m)] + K''(z)U_{h\bar{c}}}{D} \quad (4a)$$

$$\frac{dz^*}{d\bar{c}} = \frac{U_{hz}U_{h\bar{c}} - U_{z\bar{c}}U_{hh}}{D} = \frac{wm}{D} [u_{11}u_{23}w - u_{12}u_{33}] \quad (4b)$$

We can summarise the above analysis in

⁵ The absence of leisure externalities is often assumed in models with consumption or income externalities (e.g. Boskin and Sheshinski 1978, Persson 1995, Ljungqvist and Uhlig 2000, Corneo 2002, Dupor and Liu 2003, and Dodds 2012). Arrow and Dasgupta (2009) and Aronsson and Johansson-Stenman (2013) represent exceptions.

Proposition 1

- a) If individuals can decide only about contractual working hours, h , and exhibit KIJ (RAJ) preferences, more pronounced KIJ (RAJ) preferences and a higher (lower) reference level, \bar{c} , of income raise (reduce) contractual working time, h^* .
- b) If individuals can decide only about overtime, z , the strength of comparative preferences and the reference income, \bar{c} , have a basically ambiguous impact. KIJ (RAJ) preferences and $u_{12} \geq (\leq) 0$ or, alternatively, a broader definition of KIJ (RAJ), namely that $d(U_z/u_1)/d\bar{c} > (<) 0$, are sufficient for z^* to rise (fall) with the strength of KIJ (RAJ) preferences and \bar{c} .
- c) If individuals can decide on contractual working time, h , and overtime, z , jointly, the strength of comparative preferences and the reference income, \bar{c} , have an ambiguous impact on contractual hours, h^* . Furthermore, if individuals exhibit KIJ (RAJ) preferences and $u_{23} \geq (\leq) 0$ holds, more pronounced KIJ (RAJ) preferences and a higher (lower) income \bar{c} will raise (reduce) overtime, z^* .

Proof: See equation (3) for parts a) and b), equations (4) for part c), together with the definitions of KIJ and RAJ and equation (2a).

To provide an intuition for Proposition 1, we initially consider a situation in which there is no overtime ($z = 0$, part a). In this case, KIJ preferences imply that marginal utility from own income will rise with the strength of social preferences. In consequence, the individual will expand working time, h .⁶ Next, we assume that the individual can only choose overtime, z (part b). In this case, the trade-off between consumption and leisure will also be affected by the additional disutility $K'(z)$ from overtime, which does not vary with the nature of social preferences. Therefore, imposing KIJ (RAJ) in its weak form ($d(u_3/u_1)/d\bar{c} > (<) 0$) is not sufficient to determine the overtime impact of stronger relative income concerns. This will only be feasible if $u_{23} \leq 0$ holds, because such restriction implies $u_{12} > 0$ for KIJ. If, however, $u_{23} > 0$, higher reference levels of income, \bar{c} , will reduce the marginal disutility from work. If this conformism with respect to leisure is sufficiently strong, the leisure externality can dominate the income impact. In the present setting this can be the case for overtime only, because overtime induces additional utility losses $K(z)$ which are not present for contractual working time. If KIJ (RAJ) is defined more broadly as $d(U_z/u_1)/d\bar{c} > (<)$

⁶ The positive impact of KIJ preferences on hours of work in a world without overtime is a prediction obtained implicitly or explicitly in the models analysed, for example, by Seidman (1988), Persson (1995), Ljungqvist and Uhlig (2000), Corneo (2002), Alvarez-Cuadrado (2007), Tsoukis (2007), and Pérez-Asenjo (2011).

0, the impact on the marginal utility from income, u_1 , will dominate and overtime, z , will unambiguously rise (decline) with stronger KUJ (RAJ) preferences, for a given level of h .

Suppose, finally, that individuals can choose contractual working time, h , and overtime, z (part c), and furthermore, that $u_{23} = 0$ holds, so that there are no leisure externalities. In such a world, and ignoring the additional costs of overtime, individuals would substitute overtime for contractual working hours in response to a rise in reference income, \bar{c} , because overtime is associated with a wage mark up, m . However, the additional costs of overtime, $K(z)$, mitigate the impact on contractual working time, h , and can even reverse it. Therefore, the change in contractual working hours, h , is ambiguous, whereas overtime, z , rises. To complete the explanation of Proposition 1, we again allow for a non-zero cross-derivative u_{23} . If individuals exhibit conformist preferences with respect to leisure ($u_{23} > 0$), the rise in the reference level of leisure will strengthen the incentives to reduce the own level of leisure consumption. Thus, $u_{23} > 0$ enhances the rise in overtime, z . If, however, $u_{23} < 0$ applies, an individual exhibits non-conformist preferences with respect to leisure and will increase overtime, z , by less than if $u_{23} = 0$ would describe preferences. In sum, the above analysis clarifies that the labour supply effects of relative income concerns may not only be confounded by positional concerns for leisure (Pingle and Mitchell 2002), but also depend on the component of total working time looked at.

3. Data and Empirical Specifications

"In an ideal dataset, we would be able to combine information on both own income .. and reference income .. with our measure of comparison intensity ..."
(Clark and Senik 2010, p. 579)

In this section we outline the data and then show that although we do not have an ideal data set (see also McBride 2001), the SOEP data meets some of the requirements such a data set would have to fulfil. Subsequently, we describe our empirical approach.

Data

Our empirical analysis is based on the German Socio-Economic Panel (SOEP), a nationally representative longitudinal data set.⁷ First, we use the 2010 pretest module which contains novel information on the intensity of income comparisons and relative incomes. Second, we

⁷ Wagner, Frick and Schupp (2007) describe the features of this panel data set in detail. Further information is available at: <http://www.diw.de/en/soep>.

combine the data from the pretest module 2010 and the SOEP main sample of 2010 by means of cross-survey multiple imputations. Since the survey instruments used to collect this information were introduced in the 2008 pretest module and improved in the following two years we, third, merge the pretest modules from 2008 to 2010. The 2010 pretest module constitutes the basis for our estimations, unless otherwise stated, because this pretest contains the most comprehensive set of relevant control variables and the most refined questions with respect to income comparisons.

By design SOEP pretest modules are self-contained representative random samples of the resident population in Germany.⁸ The SOEP pretest modules in 2008, 2009 and 2010 each consist of data entries from somewhat more than 1000 respondents. The SOEP data from the (main) wave 2010 are representative for the resident population, but compared to the pretest module exhibit a much larger sample size. We restrict our different working samples to employed respondents aged 17 to 65 years.⁹

Representative survey data with direct measures of income comparison is rare. A key comparative advantage of the SOEP pretest modules is that they provide information on the intensity of income comparisons for an exogenously given set of potential reference groups. Moreover, the modules contain data on perceived relative income of the respondents with respect to all of these reference groups. Over the years 2008 to 2010 the two income-comparison questions have been refined with respect to the target group of respondents as well as to the wording. In 2010, for example, the comparison information was collected only if respondents were employed and had provided valid information on their gross labour income.¹⁰ The first income-comparison questions reads: *"When you think about your gross income compared to that of other groups: How important is it to you how your gross income compares to that of: (a) your neighbours, (b) your friends, (c) your colleagues at the workplace, (d) other people in your occupation, (e) people of your age, (f) your parents when they were your age, (g) your partner, (h) other women or (i) other men"*. Respondents were requested to state the intensity of income comparisons on a seven-point scale, ranging from

⁸ Detailed information on the SOEP pretest modules is provided in the yearly documentations ("Methodenbericht"; http://www.diw.de/en/diw_01.c.389728.en/soep_survey_papers.html). Schneider and Schupp (2009) provide additional information on the pretest modules 2008 and 2009.

⁹ Weights provided with the SOEP pretest modules are the result of a simple raking algorithm in order to fit a few external regional and demographic marginal distributions. The survey weights of the SOEP main sample are based on an inverse selection probability weighting combined with poststratification. Therefore, we use weights in the descriptive analysis, but not in the regression exercises.

¹⁰ In 2008, questions relating to income comparisons did not explicitly refer to gross labour income and all respondents were asked to answer them. In 2009, questions referred to gross labour income and were restricted to employed respondents. Moreover, the wording was slightly changed, in particular with respect to two gender-specific reference groups.

"*completely unimportant (1)*" to "*extremely important (7)*". The second income-comparison question always follows directly afterwards and reads: "*And how high is your gross income in comparison to the following people: ...*" Subsequently, the same list of nine potential reference groups as above is provided. Respondents were asked to describe their relative income on a five-point scale, ranging from "*much lower (1)*" to "*much higher (5)*". On the basis of this information we generate a variable labelled "*perceived relative gross income*". Since it is sometimes argued that income rank instead of relative income is more relevant for wellbeing or actions (cf. Boyce et al. 2010, Card et al. 2012), we may note in passing that this relative income variable also indicates the perceived income rank of an individual within the respective reference group.

Information on working time stems from two questions which are contained in all pretest modules and the main sample. The first enquires about weekly hours of work according to the respondent's contract. In 2010 about 60% of all employees in Germany were covered by collective bargaining contracts, while for about 20% payments and working conditions were aligned to these agreements (Ellguth and Kohaut 2011). Therefore, information about contractual hours of work, h , presumably reflects collective bargaining outcomes. This is also mirrored by the fact that 90% (85%) of all full-time employees in the 2010 main sample (pretest module) exhibit a contractual working time in the range of 35-42 hours per week. Information on total hours worked stems from a question on the average actual working time per week including overtime. Consequently, overtime is calculated as the difference between total hours worked and contractual hours.

Empirical approach

Since information on income comparisons in the 2010 pretest is only available for employed respondents who reported gross income, we cannot estimate state of the art labour supply functions (e.g. Heim 2007). Rather we use the following simple linear empirical specification to link the two measures of working time to gross income comparison measures:

$$ls_i = \alpha + ic_intensity_i * \beta + I(y_i - y_i^*) * \gamma + y_i * \delta + nly_i * \theta + x_i * \tau + \varepsilon_i. \quad (5)$$

In equation (5), ls_i either represents contractual hours (h_i) or overtime (z_i) by individual i , $ic_intensity_i$ is the measure of income comparison intensity with respect to one of the nine reference groups, $I(y_i - y_i^*)$ is (a function I of) the corresponding perceived relative gross

income, y_i is actual weekly gross labour income¹¹, nly_i is weekly net non-labour income¹² and ε_i is an idiosyncratic error term. The vector x_i of further covariates includes dummy variables for gender, education, firm size, public sector affiliation, the presence of children of less than 16 years of age in the household, marital status, and working part-time. The 2010 data additionally allows us to include a measure of risk preferences on an 11-point scale and tenure (in years) as covariates. Note that h_i is included into x_i when we focus on overtime ($ls_i = z_i$), since there is evidence that reductions in standard hours of work do not translate one to one into reductions of actual hours (e.g. Hunt 1999).

When we use data from the SOEP pretest modules to estimate the parameters of equation (5), the variable $ic_intensity_i$ is operationalized in two ways: First, we use the plain ordinal information available in the data set. Second, we generate a dummy variable, where a "1" indicates that gross income comparisons are important (*values 5 to 7*). The perceived relative gross income $I(y_i - y_i^*)$ is operationalized by means of dummy variables. When we use data from the pretest 2010 only, the dummy variable version of $I(y_i - y_i^*)$ equals "1" if the respondents classify their own income as lower than the income of the particular reference group (*values 1 and 2*). The reason is that only a small fraction of respondents in the 2010 pretest answer that their own gross income is higher than the reference income (see also Table II below). When we merge the data from the pretests 2008 to 2010 we employ two dummy variables indicating whether someone's income is lower or higher than the reference income. This allows testing the symmetry of income comparisons, i.e. whether upward and downward comparisons have differential effects on working time choices.

Equation (5) is estimated using OLS. Note that parameter estimates of y_i might be biased upwards due to unobserved individual personality traits such as the taste for work, which, in turn, may give rise to inconsistent estimates of the income comparison parameters. Therefore, we also employ an IV-specification (2SLS) and instrument an individual's gross income with the average gross income of workers of the same age (5 categories) and educational level (3 categories) from the SOEP main sample in 2010. In specifications in which nly_i is also included, we use average non-labour income calculated along the same lines as above as an instrument.

¹¹ We use weekly gross labor income, calculated as monthly gross labor income divided by 4.33, since our measure of perceived relative income is based on gross labor income. However, since state of the art labour supply function include gross hourly wages instead of (weekly) labour income, in one of our robustness checks below we also include an hourly wage measure.

¹² Net non-labor income is defined as the difference between net household income and own net income. Net income variables are used, because information on gross household income is not available in the SOEP Pretests.

We also combine the SOEP pretest working sample of 2010 with a similar working sample of the 2010 main survey by means of cross-survey multiple imputations (MI). In this case the OLS estimates of equation (5) are based on the combined and multiply imputed data set. This has two advantages: First, remarkable efficiency gains for parameter estimates for variables observed in both data sets can be expected. Second, a comparison of the estimated parameters of the multiply imputed variable "*ic_intensity_i*" with those relying on the pretest working sample, can strengthen our overall conclusions.¹³

In our particular set-up MI methods are feasible for the following reasons: (1) Since the pivotal information on income comparison intensity is not collected in the main sample, it is missing there by design. This makes the assumption very plausible that the information on income comparison is missing at random (MAR) in the main sample. (2) Both SOEP subsamples are random samples, which are representative for the resident population in Germany. (3) The dependent variables as well as all but one covariate used in our empirical specifications are available in both surveys.

These characteristics of the SOEP data sets allow us to apply standard within-survey MI-methods to the cross-survey MI case (e.g. Rendall, Ghosh-Dastidar, Weden and Nazarov 2011). We therefore, first, specify an imputation model for $E[ic_intensity_i | ls_i, I(y_i - y_i^*), \dots]$ using the SOEP pretest data. An ordered (binary) logit specification is used to cater for the ordinal (binary) character of the dependent variable *ic_intensity_i*.¹⁴ Second, we use the estimated parameters together with all relevant observed variables in the SOEP main sample to multiply impute *ic_intensity_i* in the SOEP working sample (with $m = 100$).¹⁵ Third, each of these imputed data sets is concatenated with the pretest working sample. Fourth, the parameters of equation (5) are estimated via OLS for each of the $m = 100$ completed data sets. The final parameter estimates and their standard errors are then derived using combination rules proposed by Rubin (1987). Note, that we do not multiply impute the missing information on perceived relative income $I(y_i - y_i^*)$ in the SOEP main sample, because it is technically not feasible to do this jointly for "*ic_intensity_i*" and $I(y_i - y_i^*)$. Instead, we calculate the average gross wage of the relevant reference group, excluding the respondent's own wage. If the individual gross income is lower than the average income of the particular reference group, the dummy variable "*less gross income than reference group*" equals 1.

¹³ See White and Carlin (2010) for a thorough statistical comparison of MI and a complete-case analysis.

¹⁴ The MI results presented below are nearly identical to MI parameter estimates based on a linear regression imputation model.

¹⁵ We use $m = 100$ imputations, because results using Rubins "efficiency formula" as well as Schaffer/Olsen's formula suggest this rather large number (see Graham, Olchowski and Gilreath 2007 for details).

Furthermore, we follow the suggestion of Rendall et al. (2011) to include a dummy variable in all specifications which indicates affiliation to the pretest working sample.

Descriptive statistics for all covariates of the working samples can be found in Table A1 in the Appendix.

4. Empirical Results

Table I documents the distribution of contractual hours and overtime for 2010. Overtime (z_i) fluctuates more strongly than contractual working hours (h_i). This might indicate that individuals are more likely or able to optimise with respect to overtime than contractual hours, given the institutional setting in Germany.

- Table I about here -

Since data on income comparison intensities is available for various groups, we conducted a factor analysis in order to condense information. Depending on the estimation method, we identified two or three underlying common factors. While the two reference groups "*other people in your occupation*" and "*your colleagues at the workplace*" load onto one factor (interpretable as "*job related*"), the other seven reference groups load onto one or two other common factors (related to the "*social environment*") (see Figure A1 in the Appendix).

4.1 Income Comparison and Contractual Working Hours

As suggested by the factor analysis, we started our empirical investigations with parsimonious OLS regressions of equation (5) on the basis of the 2010 pretest, where h_i was linked to the respective sets of "*job-related*" or "*social environment-related*" measures of income comparison intensity. We do not find evidence of a correlation between contractual hours of work (h_i) and any of the measures of income comparison intensity or of perceived relative income (see e.g. Tables A2/A3 in the Appendix). This also holds if we use the working samples based on the pooled pretest data (2008 – 10) or the multiply imputed combined data sets (results *not documented*). While this can obviously be due to the fact that relative income concerns do not affect choices or that respondents cannot adjust contractual working hours, it could also reflect our theoretical findings summarised in Proposition 1c). Given the absence of any correlation between the various measures of income comparison and standard or contractual working hours, the remainder of Section 4 focusses on overtime.

4.2 Income Comparison and Overtime

Once again, we start with parsimonious OLS regressions of equation (5). In this case, overtime (z_i) is the dependent variable and the covariate vector x_i as well as alternative comparison measures are included. These "horse races" indicate a statistically significant (positive) correlation between overtime and the measure of income comparison intensity with respect to the reference group "*other people in your occupation*" only (see Tables A4/A5 in the Appendix). Based on these results, we decided to only use the "*occupation-related*" measure of comparison intensity and the corresponding perceived relative income in our subsequent, more detailed empirical analysis.

Descriptive Evidence Based on the 2010 Pretest

The upper part of Table II displays the observed distribution of the indicator of income comparison intensity for the reference groups "*other people in your occupation*".

- Table II about here -

Roughly a quarter of employees in Germany regard such income comparisons as completely unimportant. The distribution is slightly left-skewed, but for 36% of respondents income comparisons are important (*values 5 to 7*). These results are in line with those by Clark and Senik (2010) based on a general question with respect to the intensity of income comparisons for 18 European countries.

The lower part of Table II shows the answers to the perceived relative income question. Strikingly, 62% of all employees reply that their gross income is about the same as that of other people in their profession. Similar numbers are reported by Mayraz, Wagner and Schupp (2010) for the 2008 pretest. Obviously, respondents either use rather broad intervals to define the category "*about the same*" or they form very narrow reference groups.¹⁶ To get an impression of (internal) reliability, we relate subjective relative income reports of male (female) respondents to average reported gross incomes in their reference group (of other (fe-) males) in the five categories.¹⁷ This comparison shows that the subjective relative income reports provide valuable information about true relative incomes.

¹⁶ Guven and Sørensen (2012) report that about half of respondents believe that "compared with American families in general" their income is about average. Knight et al. (2009) employ data from a Chinese household survey and provide descriptive statistics according to which almost 60% of all respondents classify their living standard as average. Accordingly, the use of broad comparison intervals appears to be a feature which is not restricted to Germany.

¹⁷ Figure A2 in the Appendix displays the results of this descriptive exercise. Note that for females we use only the values "1" to "4" of the subjective relative income questions, because just two females report a value of "5".

Clark and Senik (2010) report that a measure of general income comparison intensity is negatively correlated with income. Therefore, it may be conjectured that such an association also exists between our measures of comparison intensity and perceived relative income. A partial correlation analysis between the plain measures of income comparison intensity ($ic_intensity_i$) and perceived relative income $I(y_i - y_i^*)$, which controls for the set of covariates x_i mentioned above, yields an insignificant estimate of $\rho = -0.07$. If, instead, we use the dummy variable version of $I(y_i - y_i^*)$ with “1” indicating that respondents perceive to have less income than their reference group, we find a significantly positive coefficient of $\rho = 0.13$. If we finally calculate the partial correlation coefficient of dummy specifications for $ic_intensity_i$ and $I(y_i - y_i^*)$, we obtain a coefficient of $\rho = 0.11$, which is significantly different from zero. Our data accordingly provide some evidence – in line with Clark and Senik (2010) – that people who believe to earn less than their occupational reference group tend to compare incomes more intensively.

Basic Correlates Based on the 2010 Pretest

Table III presents the results from various specifications of equation (5), for which the sets of covariates vary. Columns 1 and 3 display estimates based on the plain measure of income comparison intensity, while the second and fourth column relate to estimates including the dummy variable which indicates that income comparisons are important (*values 5-7*). The specifications in every row vary with respect to the number of income comparison and “control” variables which are included into the regression.

- Table III about here -

Table III reveals that the estimated parameters of the two measures of income comparison intensity are always positive and significantly different from zero. On average employees who judge income comparisons with other people in their profession as important (*values 5 to 7*), work about 2.5 hours more overtime per week, i.e. about 7% (68%) of the average contractual working time (overtime) in the sample.

The estimated parameters of the dummy variable which measures the respondent's perceived relative income $I(y_i - y_i^*)$ are positive and statistically significant in eight out of twelve cases. On average, the estimated parameters indicate that an employee who believes that he/she earns less than the average income of other people in his/ her occupation, works about 1.8 hours overtime per week more. This is a quantitatively sizeable effect which is much stronger

than the correlation results reported by Pérez-Asenjo (2011) for the United States, on the basis of a much broader reference group defined by the investigator himself.¹⁸

Part c) of Proposition 1 asserts that a more pronounced intensity of comparisons will induce a worker to increase overtime if the individual exhibits KUJ preferences (and there is no leisure externality). Therefore, the positive and significant correlates for our measure of the strength of income comparisons and the dummy variable indicating whether a respondent perceives to have "*less gross income than other people in your occupation*" suggest that KUJ preferences are relevant and quantitatively important in Germany.¹⁹

Robustness Checks

In order to check the robustness of our results, we extended the data base of our empirical analysis in two ways. First, we used the multiply imputed combined data set of the two SOEP 2010 working samples (pretest module and main sample). Second, we employed the pooled pretest data of the years 2008-2010. Columns 2 to 5 of Table IV present a selection of estimated parameters of eight OLS specifications of equation (5) for both data sets, using income comparison information for the reference group "*other people in your occupation*".

- Table IV about here -

The results based on the MI-procedure (columns 2 and 3) reveal that the estimated parameters of the income comparison intensity variable, which is imputed in most cases in these estimations, are always significantly positive and in line with the results based on the 2010 pretest data. This is reassuring from a statistical point of view, since it indicates that the distribution of the variables of the imputation model is quite similar in both samples. Moreover, the estimated parameters of relative income are always significantly positive. They suggest that perceiving to have – or actually having – less income than the average of the occupational reference group goes along with roughly 0.5 extra hours of overtime. The estimated effect is substantially lower than the one based on the 2010 pretest data (cf. Table III).²⁰ Note that the dummy variable specification of perceived relative income $I(y_i - y_i^*)$ in the SOEP main sample relies on the assumption that the observed difference between the individual gross income and the average amount in the particular occupation is a good proxy for the unobserved perceived relative income. Therefore, our findings are consistent with the

¹⁸ Table A6 in the Appendix presents the complete list of estimated parameters for one specification.

¹⁹ We additionally tried to address the issue that individual overtime might be influenced by average overtime hours of a reference group. Including average overtime work of the hypothetical reference groups from the SOEP main sample 2010 used in the IV-strategy above does not change our results.

²⁰ Table A7 in the Appendix presents the complete list of estimated parameters for the MI-specification using the metric intensity measure and the full set of covariates documented in Table IV.

interpretation that perceived income differences have a stronger impact on working time choices than actual differences to the income of reference groups which are defined (by the investigator) on the basis of observable criteria.²¹

In columns 4 and 5 of Table IV the findings based on the pooled pretest data of the years 2008-2010 are documented. The estimated parameters of "*ic_intensity_i*" are significantly different from zero and positive in one specification only. However, the estimated parameters of perceived relative income $I(y_i - y_i^*)$ are always significantly positive and similar in size to those presented in Table III. Accordingly, respondents who perceive to have less gross income than their occupational reference group work about 2 hours of extra overtime on average. This result does not change when we include another dummy variable indicating that the respondent perceives to earn more than the average reference income. However, the estimated parameter of the dummy variable "*having more than the corresponding reference group*" is not significantly different from zero (see Table A8 in the Appendix). Therefore, comparisons seem to be mostly upward when it comes to labour supply behaviour.

As a third check of robustness, we used a subsample including only those respondents who state that (a) income comparisons are not completely unimportant ($ic_intensity_i > 1$) and (b) do not regard their relative income as "excessive" ($1 < I(y_i - y_i^*) < 5$). The idea is to check whether our results are driven by group-specific heterogeneity, e.g. whether our estimated parameters pick up differences in the effect of relative income on subjective well-being between people who care about social comparison and those who do not. To preserve a sufficient sample size, we conducted this robustness test on the pooled pretest data 2008-2010. Columns 6 to 7 document the results. The estimated parameters of our two measures of income comparison intensity are always positive and significantly different from zero. This also holds for the estimated parameters of perceived relative income $I(y_i - y_i^*)$. Hence, focussing on a more homogeneous subsample of the data strengthens our overall result that KUJ preferences are important in Germany.

Columns 8 to 11 tackle two further technical issues, based on the data from the SOEP pretest 2010. First, we employ specifications of equation (5) including gross hourly wages to cater for the concern that standard labour supply functions include an hourly wage measure instead of weekly gross income. Second, a remarkable share of workers in our sample does not work

²¹ Considering the validity of our cross-survey MI-procedure, we find that the estimated parameter of the pretest dummy (*not reported*) is never significantly different from zero at the $\alpha = 0.05$ level. The comparison of the distributions of "*ic_intensity_i*" in the observed, imputed and completed data shows that their shapes are reasonably similar, given the fact that roughly 95% of the relevant information is imputed (see Figure A3 in the Appendix).

overtime at all. Hence, a Tobit specification might be more appropriate. The estimated parameters are in line with the corresponding results presented in Table III.

Finally, the income comparison questions in the SOEP pretest are related to gross labour income. Accordingly, thus far we have employed gross measures of income wherever possible. However, the labour supply literature suggests using after-tax labour incomes. In an ultimate robustness check, we replaced gross labour income by net labour income and reran all OLS-specifications presented in Table III (i.e., for the working sample of the 2010 pretest). The estimated parameters of perceived relative income $I(y_i - y_i^*)$ and of $ic_intensity_i$ are very similar to the ones in Table III (*not documented*).

5. Summary and Concluding Discussion

Individuals tend to compare themselves to others. Furthermore, there is ample evidence that subjective wellbeing is influenced by income comparisons.²² However, indications are much more limited that relative income and the intensity of income comparisons also affect actual behaviour. This lack of empirical evidence is in stark contrast to the many theoretical studies predicting that working time varies with relative income concerns. Our first contribution to the literature is a theoretical one. We show that relative income concerns can change different components of working time choices differently. Inter alia, we clarify that stronger relative income concerns need not raise contractual working hours, even in the presence of 'Keeping up with the Joneses-preferences' and the absence of confounding relative leisure considerations. Our second contribution is of empirical nature because evidence with respect to the relationship between relative income concerns and working time is scarce. Our data at hand has two unparalleled advantages: First, we utilise information provided by survey respondents themselves, whether and how strongly they compare their own gross income to the income of nine predetermined reference groups. Second, we have information on what these individuals perceive their relative income to be with respect to the same nine reference groups. Using data from the 2010 SOEP pretest module, we find that overtime is correlated positively with the intensity with which a respondent compares his/ her income with that of people in the same occupation. Moreover, perceiving to have less gross income than such people and overtime hours are correlated positively as well. However, contractual working hours are correlated neither with the intensity of income comparison nor perceived relative

²² This also holds for our data. In a companion paper (Goerke and Pannenberg 2013) we document that income comparison intensity and perceived relative income are significantly correlated with self-reported life satisfaction.

income. These findings can basically also be obtained when, first, combining the data from the pretest module 2010 and the SOEP main sample of 2010, which does not contain the information on income comparison, by means of cross-survey multiple imputations and when, second, merging the 2010 pretest module with its two predecessors in 2008 and 2009, which differ slightly in the way in which information on income comparisons is collected.

While these estimated effects are based on the interaction of labour supply and demand, since we only observe realised working time choices, any demand-induced restriction is likely to bring about an underestimation of the true labour supply effects of relative income concerns. This is the case because realised hours of work may be less than the desired amount in the presence of demand restrictions caused, for example by downwardly rigid wages, and individuals who desire to work longer hours are more likely to be constrained in such a way.

More generally, our results suggest that reference groups are context-specific and relative income concerns affect working time choices more strongly if they relate to individuals perceived to do the same or a similar job. Therefore, estimates of the labour supply effects of relative income which are based on exogenously defined, broader reference groups may underrate the true working time consequences. Furthermore, the subjective intensity of comparisons has an impact on behaviour per se and independently of perceived relative income.

Table I: Distributions of Weekly Contractual Hours and Overtime in 2010

(percentiles; coefficient of variation (CV))

	10 th	25 th	50 th	75 th	90 th	CV
Contractual Hours h_i	35	38	40	40	40	0.10
	35	38	40	40	41	0.09
Overtime z_i	0	0	1.5	5	10	1.69
	0	0	2	5	10	1.40

Note: SOEP 2010; full-time employees, aged 17-65, weighted statistic. The first (second) row for every hours category is based on the pretest (main sample).

Table II: Importance of Income Comparison and Perceived Relative Income in 2010

	<i>How important is it to you how your gross income compares to that of other people in your occupation? (in %)</i>
1 (completely unimportant)	23.84
2	9.60
3	8.88
4	21.47
5	15.40
6	14.69
7 (extremely important)	6.12
Number of observations (N)	329
	<i>How high is your gross income in comparison to that of other people in your occupation? (in %)</i>
1 (much lower)	4.69
2 (somewhat lower)	16.86
3 (about the same)	62.47
4 (somewhat higher)	15.01
5 (much higher)	0.97
Number of observations (N)	280

Source: SOEP pretest 2010, full-time employees, aged 17-65, weighted statistics.

Table III: Working Time Choices at the Intensive Margin and Income Comparison

<i>Dependent variable: weekly overtime hours</i>				
	<i>OLS estimates</i>		<i>IV estimates</i>	
	<i>ic-measure: metric</i>	<i>ic-measure: dummy var.</i>	<i>ic-measure: metric</i>	<i>ic-measure: dummy var.</i>
ic_intensity _i	0.573** (0.199)	2.873** (0.766)	/	/
Number of observations (N)	315	315		
gross income	0.008** (0.002)	0.008** (0.002)	0.002 (0.006)	0.002 (0.006)
less gross income than reference group	1.991+ (1.118)	1.969+ (1.104)	1.659+ (0.976)	1.653+ (0.968)
ic_intensity _i	0.440* (0.223)	2.060* (0.825)	0.549* (0.223)	2.592** (0.955)
Number of observations (N)	267	267	267	267
gross income	0.008** (0.002)	0.008** (0.002)	0.002 (0.006)	0.002 (0.006)
contractual weekly hours	-0.101+ (0.059)	-0.113* (0.057)	-0.060 (0.084)	-0.077 (0.082)
less gross income than reference group	2.050+ (1.118)	2.024+ (1.101)	1.657+ (0.979)	1.643+ (0.971)
ic_intensity _i	0.435+ (0.223)	2.103* (0.823)	0.558* (0.221)	2.701** (0.930)
Number of observations (N)	267	267	267	267
gross income	0.007** (0.002)	0.007** (0.002)	-0.001 (0.010)	-0.000 (0.010)
non-labour net income	-0.000 (0.001)	0.000 (0.001)	-0.004 (0.015)	-0.003 (0.016)
contractual weekly hours	-0.108+ (0.065)	-0.117+ (0.063)	-0.095 (0.103)	-0.106 (0.104)
less gross income than reference group	1.656 (1.185)	1.702 (1.150)	1.011 (1.508)	1.188 (1.459)
ic_intensity _i	0.500* (0.234)	2.373** (0.848)	0.644* (0.275)	2.827** (0.901)
R ²	0.230	0.240	0.125	0.164
Number of observations (N)	242	242	242	242

Source: SOEP pretest 2010. OLS. Robust standard errors in parentheses.

In all specifications the following covariates are included: dummy variables for gender, education, firm size, public sector affiliation, presence of children in the household, marital status, part-time work, a measure of risk preferences on an 11-point scale, and tenure (in years). Significance levels: ** (0.01), * (0.05), + (0.10).

IV-estimates: Instrumented variables are gross income and – where applicable - non-labour net income. Instruments are corresponding average incomes from the SOEP main sample 2010 for age*education-groups.

F-Test of excluded instruments (by row and column): 14.79/15.36; 16.94/17.32; 10.07/4.76; 10.18/4.49.

Table IV: Robustness Checks: Working Time Choices at the Intensive Margin and Income Comparison

	Dependent variable: weekly overtime hours									
	Multiple Imputation (MI)		Pooled Pretest Data		ic_intensity _i >1 & (1 < I(y _i - y _i [*]) < 5)		Hourly Wage Info		Tobit	
	ic-measure: metric	ic-measure: dummy var.	ic-measure: metric	ic-measure: dummy var.	ic-measure: metric	ic-measure: dummy var.	ic-measure: metric	ic-measure: dummy var.	ic-measure: metric	ic-measure: dummy var.
gross income/gross hourly wage (<i>specification 3</i>)	0.005** (0.000)	0.004** (0.000)	0.006** (0.001)	0.006** (0.001)	0.007** (0.001)	0.007** (0.001)	0.011** (0.002)	0.011** (0.002)	0.011** (0.002)	0.011** (0.002)
less gross income than reference group	0.443* (0.208)	0.465* (0.203)	1.971** (0.594)	1.967** (0.599)	2.062** (0.677)	2.022** (0.687)	2.971+ (1.576)	2.869+ (1.544)	2.971+ (1.576)	2.869+ (1.544)
ic_intensity _i	0.363** (0.121)	1.565** (0.499)	0.126 (0.131)	0.686 (0.481)	0.603** (0.204)	1.488** (0.500)	0.510 (0.334)	2.958* (1.236)	0.510 (0.334)	2.958* (1.236)
Number of observations (N)	6880	6880	647	647	462	462	267	267	267	267
gross income/gross hourly wage (<i>specification 3</i>)	0.004** (0.000)	0.004** (0.000)	0.007** (0.001)	0.007** (0.001)	0.007** (0.001)	0.007** (0.001)	0.009** (0.002)	0.008** (0.002)	0.009** (0.002)	0.008** (0.002)
non-labour net income	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.001)	0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)	0.000 (0.002)	0.001 (0.002)	0.000 (0.002)	0.001 (0.002)
contractual weekly hours	-0.069** (0.018)	-0.080** (0.017)	-0.185** (0.051)	-0.185** (0.051)	-0.151** (0.058)	-0.150** (0.057)	-0.141 (0.119)	-0.156 (0.115)	-0.141 (0.119)	-0.156 (0.115)
less gross income than reference group	0.355+ (0.213)	0.468* (0.216)	2.022** (0.628)	2.012** (0.632)	1.927** (0.682)	1.903** (0.692)	2.211 (1.611)	2.208 (1.549)	2.211 (1.611)	2.208 (1.549)
ic_intensity _i	0.422** (0.142)	1.931** (0.510)	0.139 (0.137)	0.749 (0.492)	0.643** (0.210)	1.626** (0.511)	0.569+ (0.324)	3.326** (1.199)	0.569+ (0.324)	3.326** (1.199)
Number of observations (N)	6855	6855	595	595	433	433	242	242	242	242

Sources: *Specification 1*: SOEP 2010: Combined Sample (MI: Main Sample and Pretest); *Specifications 2, 5*: SOEP pretests 2008-2010; *Specifications 3, 4*: SOEP pretest 2010.

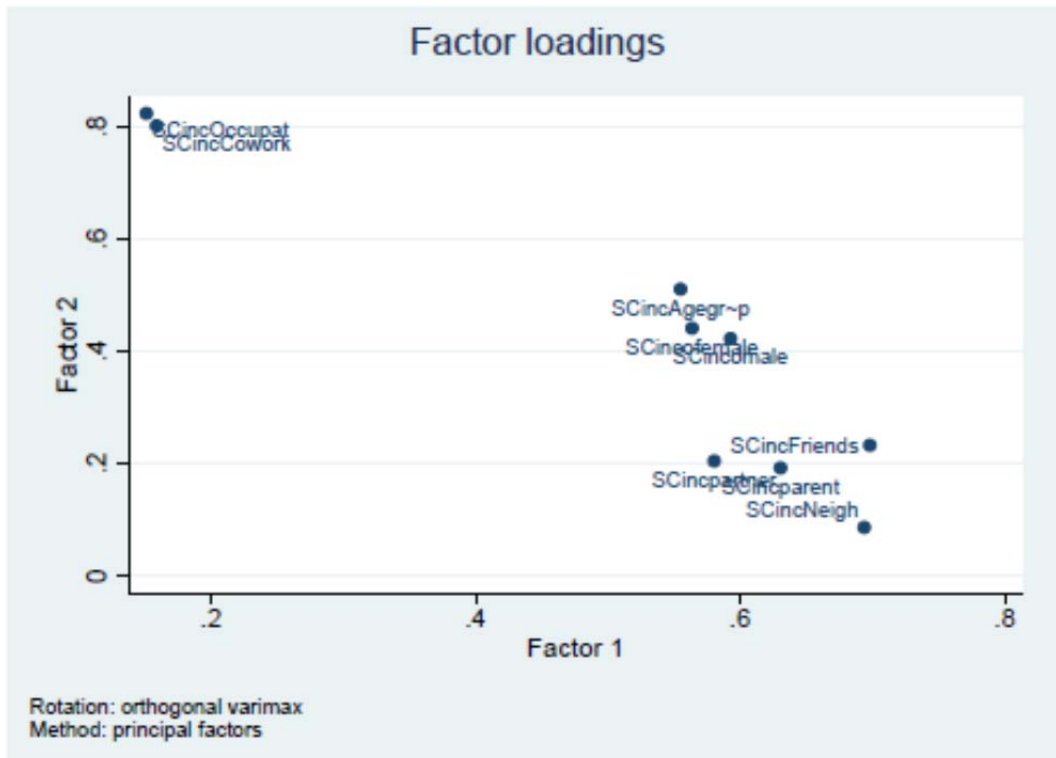
Specification 1: OLS. Estimates for each imputed data set are combined into overall estimates by Rubin's rule. Number of multiple Imputations: m = 100. Imputation Model: Ordered Logit; Binary Logit. Note: Monte Carlo Errors of coefficients are always less than 10% of the SE of the corresponding coefficients.

Specifications 2, 3, 5: OLS. *Specification 4*: Tobit. In all specifications additional covariates are included. See FN Table III for details.

Significance levels: ** (0.01), * (0.05), + (0.10).

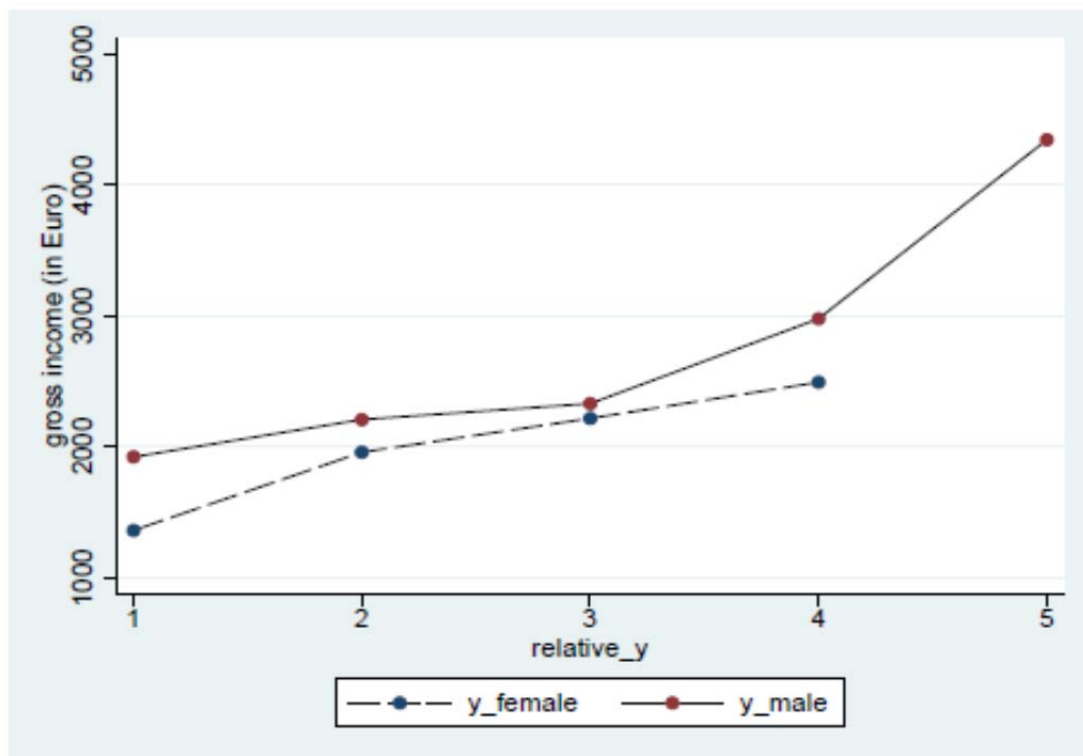
Appendix:

Figure A1: Factor loadings of the direct measures of income comparison intensity



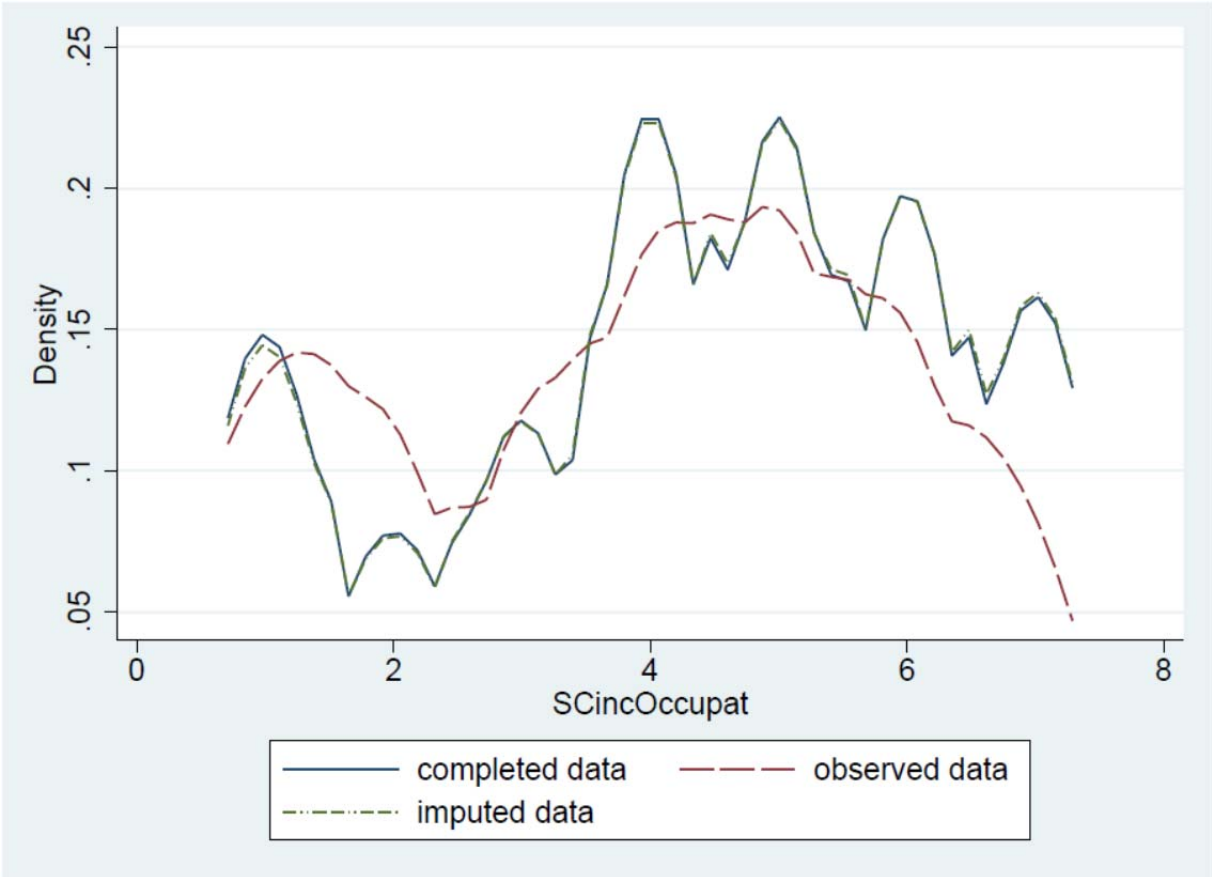
Source: SOEP pretest module 2010

Figure A2: Comparison of subjective relative income reports with reported average gross incomes in the particular categories



Source: SOEP pretest module 2010

Figure A3: Distributions of $ic_intensity_i$ in the observed, imputed and completed data.



Source: SOEP 2010. Plots are based on the specification documented in Table A7.

Table A1: Descriptive statistics

	SOEP Pretest 2010			SOEP Pooled Pretest Data		
	Mean	Std.-dev.	N	Mean	Std.-dev.	N
<i>ic_intensity: all reference groups</i>						
IC_incNeigh	1.720365	1.244835	329	1.744726	1.265338	948
IC_incFriends	2.18429	1.487074	331	2.267857	1.536344	952
IC_incCowork	3.294833	1.897046	329	3.284211	2.009792	950
IC_incOccupat	3.729483	1.976172	329	3.746065	2.108045	953
IC_incAgegroup	2.739394	1.720242	330	2.819706	1.803282	954
IC_incparent	1.972222	1.526596	324	1.933831	1.415685	937
IC_incpartner	2.461794	1.826482	301	2.495402	1.828518	870
IC_incomale	2.628049	1.819552	328	2.455898	1.764731	941
IC_incofemale	2.808511	1.915069	329	2.517572	1.789706	939
<i>I(y_i - y_i[*]): all reference groups</i>						
RI_incNeigh	2.745098	1.19264	204	2.743431	1.087083	647
RI_incFriends	2.863971	0.917173	272	2.829787	0.8834677	799
RI_incCowork	2.898601	0.7494078	286	2.880233	0.732311	860
RI_incOccupat	2.892857	0.7591396	280	2.854801	0.7391222	854
RI_incAgegroup	2.915663	0.90969	249	2.863087	0.901041	745
RI_incparent	3.445313	1.385123	256	3.393243	1.288319	740
RI_incpartner	3.095436	1.424203	241	2.939828	1.361213	698
RI_incmale	3.232558	0.9824263	258	3.131687	0.9603099	729
RI_incofemale	2.588462	1.052604	260	2.54966	1.02019	735
<i>Other variables</i>						
Contractual hours	33.92727	9.06827		34.64185	8.674401	
Overtime (difWT)	3.695868	6.206454		3.558655	5.883493	
Male	0.4834711	0.5007624		0.5042017	0.500403	
Apprenticeship	0.6363636	0.4820427		0.6554622	0.4756172	
Uni	0.2396694	0.4277664		0.2134454	0.4100842	
Part time	0.285124	0.4524092		0.2554622	0.4364876	
Size20	0.1942149	0.396415		0.2	0.4003366	
Size200	0.285124	0.4524092		0.3260504	0.4691604	
Size2000	0.2066116	0.4057135		0.1781513	0.382962	
Sizebig	0.231405	0.4226047		0.2235294	0.4169607	
Publics	0.2727273	0.4462848		0.2773109	0.4480479	
Married	0.5743802	0.4954614		0.5411765	0.4987209	
Children	0.3842975	0.4874369		0.3142857	0.4646214	
Tenure	10.44146	9.065757		--	--	
Pretest09	--	--		0.2957983	0.4567848	
Pretest10	--	--		0.4067227	0.4916356	
Grossinc (weekly)	537.5842	338.9973		535.7052	353.9802	
Non-labour inc. (week)	268.5492	271.33		244.8879	279.0313	
Risk preference	5.020661	2.419575		--	--	
N		242			595	
SOEP main sample 2010						
<i>Other variables</i>	Mean	Std.-dev.				
Contractual hours	35.41975	8.031645				
Overtime (difWT)	3.526675	5.231772				
Male	0.5162559	0.4997735				
Apprenticeship	0.7205504	0.4487627				
Uni	0.2596401	0.4384703				
Part time	0.2274308	0.4192047				
Size20	0.1554514	0.3623618				
Size200	0.2954786	0.4562921				
Size2000	0.2330259	0.4227905				
Sizebig	0.2451232	0.4301928				
Publics	0.2926055	0.4549932				
Married	0.5909572	0.4916944				
Children	0.3198246	0.4664437				
Tenure	12.07112	10.5355				
Grossinc (weekly)	600.5848	386.9076				
Non-labour inc. (week)	157.2376	415.353				
Risk preference	4.51671	2.175852				
N		6613				

Source: SOEP 2008-2010.

Table A2: "Horse race": Contractual working hours with "job-related" income comparison measures (ICinc*) (SOEP pretest 2010)

Source	SS	df	MS	Number of obs = 319		
Model	19213.3926	15	1280.89284	F(15, 303)	=	50.52
Residual	7681.93582	303	25.3529235	Prob > F	=	0.0000
				R-squared	=	0.7144
				Adj R-squared	=	0.7002
Total	26895.3284	318	84.5765045	Root MSE	=	5.0352

WTcontract	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
male	1.621804	.6459422	2.51	0.013	.3507038	2.892905
apprentices	2.13507	.8197776	2.60	0.010	.521892	3.748248
uni	3.16533	.9728493	3.25	0.001	1.250933	5.079726
tenure	.0302478	.0327621	0.92	0.357	-.0342222	.0947179
part time	-15.29048	.7231887	-21.14	0.000	-16.71359	-13.86737
size20	3.551442	1.155524	3.07	0.002	1.277574	5.82531
size200	3.565605	1.11304	3.20	0.002	1.375338	5.755873
size2000	3.799038	1.156928	3.28	0.001	1.522408	6.075669
sizebig	3.935883	1.148086	3.43	0.001	1.67665	6.195115
publics	-1.532026	.6870034	-2.23	0.026	-2.883928	-.1801246
married	-1.02523	.6563063	-1.56	0.119	-2.316725	.2662654
children	-.6572621	.6566326	-1.00	0.318	-1.9494	.6348754
riskpref	-.2599581	.1213827	-2.14	0.033	-.498818	-.0210983
ICincOccupat	.0353914	.2204935	0.16	0.873	-.398501	.4692839
ICincCowork	-.0833969	.2279768	-0.37	0.715	-.5320151	.3652213
_cons	34.38344	1.463274	23.50	0.000	31.50398	37.26291

Table A3: "Horse race": Contractual working hours with "social environment-related" income comparison measures (ICinc*) (SOEP pretest 2010)

Source	SS	df	MS	Number of obs = 286		
Model	17743.5425	20	887.177124	F(20, 265)	=	32.83
Residual	7160.83439	265	27.0220166	Prob > F	=	0.0000
				R-squared	=	0.7125
				Adj R-squared	=	0.6908
Total	24904.3769	285	87.3837785	Root MSE	=	5.1983

WTcontract	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
male	2.133335	.7533271	2.83	0.005	.6500668	3.616603
apprentices	2.664072	.917436	2.90	0.004	.857681	4.470464
uni	3.695467	1.090693	3.39	0.001	1.547941	5.842993
tenure	.0603447	.0372328	1.62	0.106	-.0129652	.1336545
part time	-14.72608	.7993718	-18.42	0.000	-16.30001	-13.15215
size20	3.06641	1.29957	2.36	0.019	.5076141	5.625206
size200	3.170114	1.284416	2.47	0.014	.6411564	5.699072
size2000	3.094669	1.304009	2.37	0.018	.5271323	5.662206
sizebig	3.468725	1.313595	2.64	0.009	.8823147	6.055136
publics	-1.805961	.7555056	-2.39	0.018	-3.293519	-.3184038
married	-1.359858	.7274557	-1.87	0.063	-2.792187	.0724701
children	-.9431531	.7203197	-1.31	0.192	-2.361431	.4751249
riskpref	-.2346569	.1328385	-1.77	0.078	-.4962101	.0268963
ICincNeigh	-.5166237	.3468913	-1.49	0.138	-1.199638	.1663901
ICincFriends	-.0642565	.3428966	-0.19	0.851	-.7394048	.6108919
ICincAgegroup	-.0271993	.266605	-0.10	0.919	-.5521328	.4977343
ICincparent	.2280648	.2691628	0.85	0.398	-.3019051	.7580346
ICincpartner	-.1515942	.2215455	-0.68	0.494	-.5878075	.2846191
ICincmale	.0794988	.3036908	0.26	0.794	-.5184551	.6774527
ICincfemale	-.2160522	.2620813	-0.82	0.410	-.7320789	.2999745
_cons	35.16006	1.670705	21.05	0.000	31.87052	38.4496

Table A4: "Horse race": Overtime with "*job-related*" income comparison measures (ICinc*)
(SOEP pretest 2010)

Source	SS	df	MS	Number of obs = 314		
Model	1685.87685	15	112.39179	F(15, 298) = 3.02		
Residual	11100.179	298	37.2489227	Prob > F = 0.0002		
Total	12786.0558	313	40.8500185	R-squared = 0.1319		
				Adj R-squared = 0.0882		
				Root MSE = 6.1032		
difWT	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
male	1.709763	.7919537	2.16	0.032	.151233	3.268294
apprentices	.2287866	1.011966	0.23	0.821	-1.762718	2.220291
uni	2.800469	1.192942	2.35	0.020	.4528114	5.148126
tenure	.0539767	.04	1.35	0.178	-.0247415	.1326949
part time	-1.169991	.8819363	-1.33	0.186	-2.905603	.5656217
size20	.3916978	1.400902	0.28	0.780	-2.365217	3.148613
size200	.353449	1.353155	0.26	0.794	-2.309501	3.016399
size2000	.3890353	1.407432	0.28	0.782	-2.380729	3.1588
sizebig	-.4065483	1.398475	-0.29	0.771	-3.158687	2.34559
publics	.5526625	.8435737	0.66	0.513	-1.107454	2.212779
married	-.1392833	.807069	-0.17	0.863	-1.72756	1.448993
children	.5261225	.8039902	0.65	0.513	-1.056095	2.10834
riskpref	.2810653	.1477895	1.90	0.058	-.0097781	.5719087
ICincOccupat	.7660953	.2698525	2.84	0.005	.2350373	1.297153
ICincCowork	-.2717941	.2766297	-0.98	0.327	-.8161894	.2726012
_cons	-1.962118	1.775543	-1.11	0.270	-5.456309	1.532074

Table A5: "Horse race": Overtime with "*social environment-related*" income comparison measures (ICinc*) (SOEP pretest 2010)

Source	SS	df	MS	Number of obs = 281		
Model	1531.84185	20	76.5920923	F(20, 260) = 1.85		
Residual	10752.0061	260	41.3538694	Prob > F = 0.0162		
Total	12283.8479	280	43.8708854	R-squared = 0.1247		
				Adj R-squared = 0.0574		
				Root MSE = 6.4307		
difWT	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
male	1.450935	.942804	1.54	0.125	-.4055682	3.307439
apprentices	.1969943	1.160513	0.17	0.865	-2.088207	2.482196
uni	3.041964	1.370241	2.22	0.027	.3437806	5.740147
tenure	.0662222	.0465176	1.42	0.156	-.0253769	.1578213
part time	-1.607914	.9974888	-1.61	0.108	-3.572099	.3562713
size20	.1668861	1.608576	0.10	0.917	-3.000609	3.334382
size200	.5405027	1.593338	0.34	0.735	-2.596987	3.677992
size2000	.1630014	1.618678	0.10	0.920	-3.024386	3.350388
sizebig	-.4376295	1.632933	-0.27	0.789	-3.653087	2.777828
publics	.48423	.9501527	0.51	0.611	-1.386744	2.355204
married	-.5571532	.9123781	-0.61	0.542	-2.353744	1.239438
children	.6145047	.9009204	0.68	0.496	-1.159525	2.388534
riskpref	.3000089	.1651834	1.82	0.070	-.0252586	.6252765
ICincNeigh	.4570965	.4308331	1.06	0.290	-.39127	1.305463
ICincFriends	-.655739	.4252526	-1.54	0.124	-1.493117	.1816387
ICincAgegroup	.2956904	.331637	0.89	0.373	-.357346	.9487269
ICincparent	.0231777	.3333252	0.07	0.945	-.6331829	.6795383
ICincpartner	-.3095118	.2743948	-1.13	0.260	-.8498308	.2308072
ICincmale	.2079882	.3820917	0.54	0.587	-.5444	.9603764
ICincfemale	.0137312	.3271599	0.04	0.967	-.6304891	.6579515
_cons	.3551914	2.069537	0.17	0.864	-3.719996	4.430379

Table A6: Complete results: Working Time Choices at the Intensive Margin and Income Comparison (SOEP pretest 2010)

Linear regression

Number of obs = 267
 F(17, 249) = 4.80
 Prob > F = 0.0000
 R-squared = 0.2580
 Root MSE = 5.8503

difWT	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
male	1.745025	.7846866	2.22	0.027	.1995556	3.290494
apprentices	-.3716318	1.240916	-0.30	0.765	-2.815663	2.072399
uni	.0045609	1.523954	0.00	0.998	-2.996923	3.006045
tenure	-.0149349	.0503477	-0.30	0.767	-.1140965	.0842267
part time	-.125599	1.225684	-0.10	0.918	-2.539629	2.288431
size20	1.139499	1.458632	0.78	0.435	-1.733332	4.012329
size200	.423523	1.16883	0.36	0.717	-1.878531	2.725577
size2000	-.4446255	1.217059	-0.37	0.715	-2.841668	1.952417
sizebig	-.7555958	1.149078	-0.66	0.511	-3.018748	1.507556
publics	.2490529	.85216	0.29	0.770	-1.429308	1.927413
married	-1.256777	.9542231	-1.32	0.189	-3.136155	.6226005
children	.4256054	.807783	0.53	0.599	-1.165353	2.016564
riskpref	.2793643	.1652546	1.69	0.092	-.0461107	.6048393
grossinc	.0081876	.001892	4.33	0.000	.0044611	.011914
contractual h.	-.1125054	.0568703	-1.98	0.049	-.2245135	-.0004974
lessincOccupat	2.024141	1.101045	1.84	0.067	-.1444076	4.19269
impSCOoccupat	2.103187	.8230969	2.56	0.011	.4820674	3.724307
_cons	.4105041	2.491085	0.16	0.869	-4.49578	5.316788

Table A7: Complete results for MI-Procedure: Working Time Choices at the Intensive Margin and Income Comparison

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Multiple-imputation estimates          Imputations      =      100
Linear regression                     Number of obs    =      6855
                                       Average RVI      =      1.6522
                                       Largest FMI      =      0.9470
                                       Complete DF     =      6835
DF adjustment: Small sample          DF: min         =      85.24
                                       avg             =      750.69
                                       max            =      6449.60
Model F test: Equal FMI              F( 19, 2818.0) =      23.09
Within VCE type: OLS                 Prob > F        =      0.0000

```

difWT	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
male	.6189647	.1780638	3.48	0.001	.2692961	.9686333
	.0107177	.0051124	0.13	0.000	.0167113	.0125261
apprentices	-.4904521	.2525516	-1.94	0.053	-.9881957	.0072916
	.0201305	.0104004	0.09	0.011	.033418	.0235578
uni	.3036994	.2653833	1.14	0.254	-.218876	.8262749
	.0202494	.014582	0.12	0.048	.041376	.0282749
tenure	-.0559127	.0087871	-6.36	0.000	-.073182	-.0386435
	.0005814	.0003147	0.25	0.000	.000752	.0009463
part time	-.7444412	.3208715	-2.32	0.021	-1.374583	-.1142992
	.01948	.011086	0.12	0.006	.021966	.0353168
size20	.4257204	.3427934	1.24	0.215	-.2476122	1.099053
	.0213909	.0113156	0.09	0.032	.0362283	.0248042
size200	.3253498	.3269226	1.00	0.320	-.3169474	.9676471
	.0209335	.0114548	0.08	0.038	.0333919	.0282839
size2000	-.1386833	.3287065	-0.42	0.673	-.78422	.5068533
	.0199902	.0116176	0.06	0.043	.0341426	.0264548
sizebig	-.1983566	.3281744	-0.60	0.546	-.8427723	.4460591
	.0196215	.0112787	0.06	0.037	.034556	.0240885
publics	-.3153478	.1795417	-1.76	0.080	-.6680029	.0373073
	.0111634	.0050453	0.08	0.013	.0152293	.0147851
married	.1491683	.1869296	0.80	0.425	-.2183006	.5166373
	.0126859	.0073893	0.08	0.047	.0212798	.017378
children	-.2649827	.1907279	-1.39	0.166	-.6400278	.1100624
	.0132682	.0065177	0.10	0.030	.0142608	.0220417
riskpref	.1344895	.0374692	3.59	0.000	.0608518	.2081271
	.002479	.0017135	0.14	0.000	.0030005	.0051516
pretest	.5258462	.329813	1.59	0.111	-.1206967	1.172389
	.0049614	.0005382	0.02	0.003	.0050968	.0050483
grossinc	.0044128	.0002956	14.93	0.000	.0038325	.0049932
	.0000174	7.38e-06	0.39	0.000	.0000254	.0000197
otherinc	-.0004515	.0002832	-1.59	0.112	-.0010096	.0001066
	.0000225	.0000181	0.14	0.030	.0000402	.0000447
contractual h.	-.0686426	.0167631	-4.09	0.000	-.1015701	-.0357152
	.0010479	.0005718	0.16	0.000	.0014714	.0016175
lessincOccupat	.3552238	.2127356	1.67	0.096	-.0628289	.7732764
	.0139627	.0073388	0.10	0.020	.0237984	.0158174
ICincOccupat	.4223295	.1418824	2.98	0.004	.1402406	.7044184
	.0137295	.0075961	0.19	0.002	.0209765	.0200402
_cons	1.585624	.9058735	1.75	0.081	-.1973224	3.36857
	.0672527	.0464438	0.15	0.024	.1408296	.0797377

Note: values displayed beneath estimates are Monte Carlo error estimates.

Table A8: Complete results for pooled pretest data: Working Time Choices at the Intensive Margin and Income Comparison

Linear regression

Number of obs = 647
 F(19, 627) = 6.06
 Prob > F = 0.0000
 R-squared = 0.1850
 Root MSE = 5.4761

difWT	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
male	.5068348	.4857057	1.04	0.297	-.4469721	1.460642
apprentices.	.4685095	.6290676	0.74	0.457	-.766825	1.703844
uni	1.362801	.9293701	1.47	0.143	-.4622538	3.187856
age	-.0422669	.0232458	-1.82	0.070	-.087916	.003382
part time	-1.72398	.9474505	-1.82	0.069	-3.584541	.136580
size20	1.240155	.8337539	1.49	0.137	-.3971328	2.877443
size200	.9714569	.6811378	1.43	0.154	-.3661308	2.309045
size2000	.1689233	.7708407	0.22	0.827	-1.344819	1.682665
sizebig	-.1015673	.7206933	-0.14	0.888	-1.516832	1.313698
publics	.05469	.483805	0.11	0.910	-.8953843	1.004764
married	-.5407694	.5600491	-0.97	0.335	-1.640569	.5590297
children	-.4556521	.5281685	-0.86	0.389	-1.492846	.5815412
pretest09	.7512642	.5453324	1.38	0.169	-.3196348	1.822163
pretest10	.7165827	.5116083	1.40	0.162	-.2880905	1.721256
grossinc	.0068129	.0010786	6.32	0.000	.0046948	.0089311
contractual h.	-.1643082	.0480539	-3.42	0.001	-.2586744	-.0699421
lessincOccupat	2.1043	.6017533	3.50	0.001	.9226043	3.285996
moreincOccupat	.308659	.6268209	0.49	0.623	-.9222634	1.539582
ICincOccupat	.1301952	.1291809	1.01	0.314	-.1234844	.3838749
_cons	5.254445	2.110677	2.49	0.013	1.109594	9.399297

References

- Abel, 1990, Asset Prices under Habit Formation and Catching up with the Joneses, *American Economic Review* P&P 80(2), 38-42.
- Alvarez-Cuadrado, Francisco (2007), Envy, Leisure, and Restrictions on Working Hours, *Canadian Journal of Economics* 40(4), 1286-1310.
- Aronsson, Thomas, Blomquist, Sören and Hans Sacklén (1999), Identifying Interdependent Behaviour in an Empirical Model of Labour Supply, *Journal of Applied Econometrics* 14(6), 607-626.
- Aronsson, Thomas and Olof Johansson-Stenman (2010), Positional Concerns in an OLG-Model: Optimal Labor and Capital Income Taxation, *International Economic Review* 51(4), 1071-1095.
- Aronsson, Thomas and Olof Johansson-Stenman (2013), Conspicuous Leisure: Optimal Income Taxation When Both Relative Consumption and Relative Leisure Matter, *Scandinavian Journal of Economics* 115(1), 155-175.
- Arrow, Kenneth J. and Partha S. Dasgupta (2009), Conspicuous Consumption, Inconspicuous Leisure, *The Economic Journal* 119 (541), F497-516.
- Boskin, Michael T. and Eytan Sheshinski (1978), Optimal Redistributive Taxation When Individual Welfare Depends upon Relative Income, *The Quarterly Journal of Economics* 92(4), 589-601.
- Boyce, Christopher J., Brown, Gordon D. A. and Simon C. Moore (2010), Money and Happiness: Rank of Income, Not Income, Affects Life Satisfaction, *Psychological Science* 21(4), 471-475.
- Card, David, Mas, Alexandre, Moretti, Enrico and Emmanuel Saez (2012), Inequality at Work: The Effect of Peer Salaries on Job Satisfaction, *American Economic Review* 102(6), 2981-3003.
- Clark, Andrew E. (forthcoming), Happiness, Habits and High Rank: Comparisons in Economic and Social Life, in: Bartolini, Stefano, Bruni Luigino and Pierluigi Porta (eds.) *Policies for Happiness*, Oxford: Oxford University Press, also available as IZA DP 5966.
- Clark, Andrew E., Frijters, Paul and Michael A. Shields (2008), Relative Income, Happiness, and Utility: An Explanation for the Easterlin Paradox and Other Puzzles, *Journal of Economic Literature* 46(1), 95-144.
- Clark, Andrew E. and Claudia Senik (2010), Who Compares To Whom? The Anatomy of Income Comparisons in Europe, *The Economic Journal* 120 (544), 573-594
- Corneo, Giacomo (2002), The Efficient Side of Progressive Income Taxation, *European Economic Review* 46(7), 1359-1368.
- de la Garza, Adrian, Mastrobuoni, Giovanni, Sannabe, Atsushi and Katsunori Yamada (2012), The Relative Utility Hypothesis with and without Self-reported Reference Wages, (http://www.iser.osaka-u.ac.jp/coe/dp/pdf/no.164_dp_revised.pdf, accessed September 26, 2012)
- Dodds, Stefan (2012), Redistributive Taxation with Heterogeneous Relative Consumption Concerns, *Canadian Journal of Economics* 45(1), 220-246.
- Duesenberry, James S. (1949), *Income, Savings and the Theory of Consumer Behavior*, Cambridge MA: Harvard University Press.
- Dupor, Bill and Wen-Fang Liu (2003), Jealousy and Equilibrium Overconsumption, *American Economic Review* 93(1), 423-428.

- Eaton, B. Curtis and Mukesh Eswaran (2003), The Evolution of Preferences and Competition: A Rationalization of Veblen's Theory of Invidious Comparisons, *The Canadian Journal of Economics* 36(4), 832-859.
- Ellguth, Peter and Susanne Kohaut (2011), Tarifbindung und betriebliche Interessenvertretung: Aktuelle Ergebnisse aus dem IAB-Betriebspanel 2010, *WSI-Mitteilungen* 5/2011, 242-247.
- Falk, Armin and Markus Knell (2004), Choosing the Joneses: Endogenous Goals and Reference Standards, *Scandinavian Journal of Economics* 106(3), 417-435.
- Fehr, Ernst and Klaus M. Schmidt (1999), A Theory of Fairness, Competition, and Cooperation, *The Quarterly Journal of Economics* 114(3), 817-868.
- Ferrer-i-Carbonell, Ada (2005), Income and Well-being: An Empirical Analysis of the Comparison Income Effect. *Journal of Public Economics*, 89(5-6), 997-1019.
- Ferrer-i-Carbonell, Ada (forthcoming), Happiness Economics, *SERIES – Journal of the Spanish Economic Association*.
- Frank, Robert H. (1985), The Demand for Unobservable and Other Nonpositional Goods, *The American Economic Review* 75(1), 101-116.
- Galí, Jordi (1994), Keeping Up with the Joneses: Consumption Externalities, Portfolio Choice, and Asset Prices, *Journal of Money, Credit, and Banking* 26(1), 1-8.
- Goerke, Laszlo and Markus Pannenberg (2013), Income Comparisons and Subjective Well-Being: Direct Evidence from Germany, IAAEU Discussion Paper Series in Economics No. 03/2013 and SOEP Papers No. 549 (http://www.diw.de/documents/publikationen/73/diw_01.c.419126.de/diw_sp0549.pdf; accessed April 16, 2013).
- Graham, John W., Olchowski, Allison E. and Tamika D. Gilreath (2007), How Many Imputations are Really Needed? Some Practical Clarifications of Multiple Imputation Theory, *Prevention Science* 8(3), 206-213.
- Guvan, Cahit and Bent E. Sørensen (2012), Subjective Well-Being: Keeping up with the Perception of the Joneses, *Social Indicators Research* 109, 439-469.
- Hart, Robert A. (2004), *The Economics of Overtime Working*, Cambridge: Cambridge University Press.
- Heim, Bradley T. (2007), The Incredibly Shrinking Elasticities. Married Female Labor Supply 1978-2002, *Journal of Human Resources* 42(4), 881-918.
- Hunt, Jennifer (1999). Has Work-sharing Worked in Germany? *The Quarterly Journal of Economics* 114(1), 117-148.
- Ireland, Norman J. (1998), Status-seeking, Income Taxation and Efficiency, *Journal of Public Economics* 70(1), 99-113.
- Ireland, Norman J. (2001), Optimal Income Tax in the Presence of Status Effects, *Journal of Public Economics* 81(2), 193-212.
- Knight, John, Song, Lina and Ramani Gunatilaka (2009), Subjective Well-being and its Determinants in Rural China, *China Economic Review* 20(4), 635-649.
- Layard, Richard (2005), Rethinking Public Economics: The Implications of Rivalry and Habit, in: Bruni, Luigino and Pier Luigi Porta (eds), *Economics and Happiness – Framing the Analysis*, 147-169, Oxford: Oxford University Press.
- Liu, Wen-Fang and Stephen J. Turnovsky (2005), Consumption Externalities, Production Externalities and Long-run Macroeconomic Efficiency, *Journal of Public Economics* 89(5-6), 1097-1129.
- Ljungqvist, Lars and Harald Uhlig (2000), Tax Policy and Aggregate Demand Management under Catching up with the Joneses, *American Economic Review* 90(3), 356-366.

- Mayraz, Guy, Wagner, Gert G. and Jürgen Schupp (2010), Life Satisfaction and Relative Income – Perceptions and Evidence, Manuscript (<http://www.mayraz.com/papers/MWS09%20Relative%20Income.pdf>, accessed July 6, 2012).
- McBride, Michael (2001), Relative-income Effects on Subjective Well-being in the Cross-section, *Journal of Economic Behavior & Organization* 45(3), 251-278.
- Mui, Vai-Lam (1995), The Economics of Envy, *Journal of Economic Behavior & Organization* 26(3), 311-336.
- Neumark, David and Andrew Postlewaite (1998), Relative Income and the Rise in Married Women's Employment, *Journal of Public Economics* 70(1), 157-183.
- Pannenberg, Markus (2005), Long-Term Effects of Unpaid Overtime. Evidence for West Germany, *Scottish Journal of Political Economy* 52(2), 177-193.
- Park, Yongjin (2010), The Second Paycheck to Keep up with the Joneses: Relative Income Concerns and Labor Market Decisions of Married Women, *Eastern Economic Journal* 36(2), 255-276.
- Pérez-Asenjo, Eduardo (2011), If Happiness is Relative, Against Whom Do We Compare Ourselves? Implications for Labour Supply, *Journal of Population Economics* 24(4), 1411-1442.
- Persson, Mats (1995), Why are Taxes so High in Egalitarian Societies?, *Scandinavian Journal of Economics* 97(4), 569-580.
- Pingle, Mark and Mike Mitchell (2002), What Motivates Positional Concerns for Income?, *Journal of Economic Psychology* 23(1), 127-148.
- Rendall, Michael S., Gosh-Dastidar, Bonnie, Weden, Margaret M. and Zafar Nazarov (2011), Multiple Imputation for Combined-Survey Estimation with Incomplete Regressors in One but not Both Surveys, Rand Working Paper 887-1.
- Rubin, Donald B. (1987), *Multiple Imputation for Nonresponse in Surveys*, New York: Wiley.
- Schneider, Simone and Jürgen Schupp (2010), Measuring the Selection of Pay Referents – A Methodological Analysis of the Questions on Pay Referents in the 2008 and 2009 Pretest Modules, SOEP Data Documentation 48, (http://www.diw.de/documents/publikationen/73/diw_01.c.354673.de/diw_datadoc_2010-048.pdf, accessed September 20, 2012).
- Seidman, Laurence S. (1988), The Welfare Costs of a Relativistic Economy, *Journal of Post Keynesian Economics* 11(2), 295-304.
- Senik, Claudia (2005), Income Distribution and Well-being: What can we Learn from Subjective Data, *Journal of Economic Surveys* 19(1), 43-63.
- Senik, Claudia (2009), Direct Evidence on Income Comparisons and Their Welfare Effects, *Journal of Economic Behavior & Organization* 72(1), 408-424.
- Tsoukis, Chris (2007), Keeping up with the Joneses, Growth, and Distribution, *Scottish Journal of Political Economy* 54(4), 575-600.
- Wagner, Gerd G., Frick, Joachim R. and Jürgen Schupp (2007), The German Socio-Economic Panel Study (SOEP) – Scope, Evolution, and Enhancements, *Schmollers Jahrbuch* 127(1), 139-169.
- White, Ian R. and John B. Carlin (2010), Bias and Efficiency of Multiple Imputation Compared with Complete-case Analysis for Missing Covariate Values, *Statistics in Medicine* 29(28), 2920-2931.