

Relative Income and Job Satisfaction: Evidence from Australia

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Abstract Using the first six waves of the Household, Income and Labour Dynamics in Australia (HILDA) Survey dataset, a linear fixed effects model is used to examine the link between relative income and overall job satisfaction in Australia. In this paper, relative income is constructed using cell average by age group, gender and education level. The findings indicate that (i) relative income has a significant negative impact on overall job satisfaction for men but not for women; and (ii) for the whole sample and for men, income comparisons are asymmetric and upwards, meaning that the loss in overall job satisfaction by the poor from having an income below that of their reference group is significantly greater than the gain by the rich from knowing that they earn above that of their reference group. Overall, the evidence found is consistent with Duesenberry's hypothesis that relative income matters and comparison effect is asymmetric and mostly upwards.

Keywords Asymmetry · Australia · Comparison income · Job satisfaction · Reference group income · Relative income

JEL Classification C33 · J28 · J31

Introduction

The relative income hypothesis, which was developed by Duesenberry (1949), says that the satisfaction (or utility) an individual derives from a given consumption level depends on its relative magnitude in the society rather than its absolute level. According to this hypothesis, an individual's attitude to consumption is dictated more by his/her income in relation to others than by abstract standard of living. This

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implies that comparisons in the utility function seem to matter more. Such a hypothesis is in line with Tversky and Kahneman's (1991) prospect theory, which says that utility is reference based.

Duesenberry's relative income hypothesis, despite its insightful and empirical appeal, was not widely accepted by many, but rather superseded by the life-cycle hypothesis of Franco Modigliani and Richard Brumberg (1954) and the permanent income hypothesis of Milton Friedman (1957). The life-cycle hypothesis says that lifetime resources, rather than current income, are what determine the level of consumption, whereas the permanent income hypothesis states that a person's current spending depends not on his/her current income but rather on his/her long-run or permanent level of income. The life cycle hypothesis shares many features with the permanent income hypothesis. The main difference between the two hypotheses is the planning horizon, which is assumed finite in the life-cycle hypothesis and infinite in the permanent income hypothesis (Jappelli 2005).

Renewed interest in Duesenberry's relative income hypothesis began to emerge in the 1970s partly due to the growing evidence that people seem to care about relative income (Douglas and Isherwood 1978; Easterlin 1974; Frank 1985, 1997; Gaertner 1973; Krelle 1972; Michalos 1985; Pollak 1976). Specifically, it started to proliferate in the job satisfaction and happiness literature following the evidence presented by Easterlin (1973) and later by Hamermesh (1977), Cappelli and Sherer (1988) and Clark and Oswald (1996).

In his paper, Easterlin (1973) highlighted the importance of relative income in determining individual happiness. He stated that within a country, happiness is higher for the rich because they are comparing themselves to the country average. Thus, the rich are happier not because they have a lot but rather because they have more (Mayraz et al. 2010). Such a finding has its own policy implications that favor the promotion of gross national happiness (but not gross national product) once basic needs have been met. Easterlin's view that absolute income does not play a substantial role in determining happiness is contested by those who found evidence of a positive and significant link between absolute income and happiness/wellbeing (Hagerty and Veenhoven 2003; Stevenson and Wolfers 2008). From a policy perspective, the positive impact that absolute income has on happiness implies that any government should strive to promote and speed up economic growth.

In his theoretical model, Hamermesh (1977) specified that individual utility was affected by relative income, defined as the difference between current income and expected income. Cappelli and Sherer (1988) used the idea of an outside market wage (computed by averaging pay for certain occupations) to measure the impact that comparison income has on pay satisfaction, and Clark and Oswald (1996) included a predicted income variable (as a proxy for comparison income) in their model to measure job satisfaction.

Most studies that include income variables (both absolute and relative income) in their empirical analysis found a significant negative relationship between relative income and job satisfaction (Brown et al. 2008; Cappelli and Sherer 1988; Clark and Oswald 1996; Lévy-Garboua and Montmarquette 2004). This significant negative relationship indicates that workers have direct concern about the earnings of their reference group, and use information on earnings of their reference group to

determine their own level of job satisfaction.¹ Thus, for those whose income is below that of their reference group the revelation of this information has a negative effect on their level of job satisfaction and vice versa to those whose income is above that of their reference group. As pointed out by Clark et al. (2009) and Gao and Smyth (2010), a significant negative coefficient for relative income signifies a status effect because the higher earnings of a reference group make an employee jealous, thereby reducing his/her level of job satisfaction. This is identical to the idea of the relative deprivation theory, where a worker may feel deprived and frustrated when his/her earnings fall relative to the reference group.

A significant negative sign for the relative income coefficient does only mean that overall people are less satisfied with their job, if they know that they earn less than that of their reference group. It doesn't give evidence whether or not income comparisons are asymmetric. The job satisfaction level of individuals can be negatively affected if they earn less compared to the pay of their reference group, however, this might not apply (or apply to a lesser extent) to individuals with income above that of their reference group to experience a positive impact on job satisfaction. To be symmetric, the marginal importance of relative income comparisons should be the same regardless of whether income is lower or higher than that of the reference group.

In his book, Duesenberry (1949) postulated that social comparisons of income are not symmetric, implying that people look up but not down when making comparisons. This hypothesis is later empirically supported by many including Blanchflower and Oswald (2004), Boyce et al. (2010), Fehr and Schmidt (1999), Ferrer-i-Carbonell (2005) and Frank (1985). In the context of prospect theory, such a claim is similar to loss aversion, implying that it is steeper for losses (falling below a given reference point) than for gains (falling above a given reference point).

Ferrer-i-Carbonell (2005), using data from the German Socio-Economic Panel Study (GSOEP), found that for West Germans income comparisons are asymmetric and upward, implying that poorer individuals' well being is negatively affected by the fact that their income is lower than that of their reference group, while richer individuals do not get happier from knowing their income is above that of their reference group. A similar conclusion is also made by Boyce et al. (2010) in their study on money and happiness using the British Household Panel Survey (BHPS) dataset. To the contrary, Mayraz et al. (2010), using data from the GSOEP, found that the marginal importance of relative income comparisons was symmetric, indicating that the poor did not lose (in life satisfaction) by relative comparisons more than the gain by the rich. Different from the above, McBride (2001), using the (US) General Social Survey (GSS) data, found that the comparison income effect on subjective well-being was higher for the rich than for the poor. Opposite to this, Wunder and Schwarze (2006) using data from the GSOEP found that the rich gain less (in job satisfaction) from knowing that their income is above that of their reference group compared to what the poor lose from having an income lower than that of their reference group. Another interesting finding by D'Angelo and Zazzaro (2009) based on the (Italian) Survey of Household Income and Wealth (SHIW) data was that both the richer and the poorer groups were negatively affected by relative income because

¹ In this paper, a reference group income is synonymous to relative income or comparison income.

of the creation of discouragement for the poorer group (knowing that they get lower income with respect to their reference group) and anxiety and disutility for the richer group (knowing that they get higher income with respect to their reference group).

One common aspect in the above findings is that people become less satisfied when knowing that their income is less than that of their reference group, however, the satisfaction level of those receiving higher income with respect to their reference group either remains unchanged and thus asymmetric upward (Boyce et al. 2010; Ferrer-i-Carbonell 2005) or increases but asymmetric upward (Wunder and Schwarze 2006) or increases and asymmetric downward (McBride 2001) or increases and symmetric (Mayraz et al. 2010) or decreases and symmetric (D'Angelo and Zazzaro 2009).

Research on the impact of relative income on job satisfaction in Australia is limited. To the best of my knowledge, there is no published material that assesses whether or not the impact of income comparisons on job satisfaction is asymmetric. There is some body of research that incorporates a relative income variable in a model measuring job satisfaction. In his study of pay level satisfaction, Brown (2001) used five pay referents for income comparisons and found that the market referent (pay comparisons with others doing like work in other organizations) was the most important to all workers. The paper, however, only concentrated on public sector employees and was restricted to a cross-sectional data. In her study of job satisfaction, Long (2005) included a comparison income variable that indicates whether employees consider themselves to be fairly paid or not, and found a significant and positive result for workers who felt that they were paid fairly for work done. Long's paper also uses cross-sectional data from wave 1 of the HILDA Survey. To the contrary, this paper not only uses a panel dataset but also tests for asymmetry of income comparisons.

The core objective of this paper is twofold: 1) to estimate the impact of reference group income on overall job satisfaction; and 2) to test for asymmetry of income comparisons. The main hypotheses under study are: individual job satisfaction depends on the income of the reference group; and income comparisons are asymmetric. The findings from this paper have important policy implications related to income redistribution and taxation.

Following the introduction section this paper is structured as follows. “**Method**” describes the dataset and preliminary statistical results and presents the empirical framework for estimating the effect of income and other personal and demographic characteristics on job satisfaction. “**Results**” reports the econometric results of the study, while “**Discussion**” provides an interpretation of the results. Finally, the paper closes with the main conclusions of the study.

Method

Dataset

Data for this study are drawn from the first six waves of the HILDA Survey panel dataset. The survey was initiated and is funded by the Australian Government through the Department of Families, Housing, Community Service and Indigenous Affairs (FaHCSIA). Responsibility for the design and management of the survey rests

with the Melbourne Institute of Applied Economics and Social Research (University of Melbourne).

The HILDA Survey is Australia's only large-scale nationally representative longitudinal household survey which interviews the same households and individuals each year. It began in 2001 and collects information about economic and subjective well-being, labor market dynamics and family dynamics. There is information on income, firm size, union membership, occupation and industry type, qualification levels attained, and of particular interest to this paper, job satisfaction measures. A complete list of variables and definitions used in this study is provided in Table 1. The panel dataset used in this paper is unbalanced, hence susceptible to selection bias related to attrition. To verify this, a test of non-response bias proposed by Verbeek and Nijman (1992) is done and no evidence is found to support the problem of attrition bias.

In this paper, the individual person dataset across the six waves (2001–2006) is utilized. This provides an initial sample of 55219 observations after checking for inconsistencies in the data, removing individuals with incomplete answers and confining individuals to those within the labor force age group of 16–64 years. Of this sample 28039 (or 50.78 %) are employees. This excludes those employed in family businesses and those who are self-employed.

To analyze the impact of income on overall job satisfaction a specification that includes own income and the income of the reference group, together with other variables measuring individual socioeconomic and demographic characteristics, is presented in the empirical analysis. The HILDA Survey asks participants about overall job satisfaction, with satisfaction scores ranging from 0 (completely dissatisfied) to 10 (completely satisfied). Usually, a reference group is computed with cell mean method based on selected characteristics (Blanchflower and Oswald 2004; Cappelli and Sherer 1988; Card et al. 2011; Clark et al. 2009; Ferrer-i-Carbonell 2005; de la Garza et al. 2010; Luttmer 2005; McBride 2001). It can be based on one or more characteristics, such as education level, age, employment status, gender, geographical location, etc. Another comparison group can be formed based on some closeness such as friendship and work colleagueship (Brown et al. 2008; Clark et al. 2009; de la Garza et al. 2010; Rizzo and Zeckhauser 2003). In this paper, reference group contains all workers with similar education level, inside the same age group and the same gender. Education level is divided into 7 categories, namely masters and PhD, postgraduate diploma and certificate, degree, diploma, certificate, year 12 and year 11 or less. Age is categorized into 10 groups, namely 16–20 years, 21–25 years, 26–30 years, 31–35 years, 36–40 years, 41–45 years, 46–50 years, 51–55 years, 56–60 years and 61–64 years.

The average income of a reference group (I_r) can be calculated as follows:

$$\frac{1}{N_i} \sum_i I_o, \quad (1)$$

where i denotes for individuals belonging to the same reference group, I_o stands for own income and N denotes for size of the reference group.

Table 1 Variable list and descriptive statistics

List	Description	Mean/proportion (Standard deviation)
Personal characteristics		
Overall job satisfaction	Job satisfaction score on a scale 0–10 (dependent variable)	7.60 (1.78)
Female	Female individuals (omitted case—male individuals)	0.48 (0.50)
Age (between 16 and 64)	Individual is aged between 16 and 64 years (continuous variable)	38.44 (11.41)
Married / de facto	Individual is either married or living in a de facto relationship (omitted case—individuals not married or living in de facto relationships (omitted case)	0.68 (0.47)
Long term health problems	Individual has long-term health problems (omitted case—individual has no long term health problems)	0.14 (0.35)
Non-indigenous ABRs	Australian Born Resident not of Aboriginal or Torres Straits Islander background (omitted case)	0.78 (0.42)
ATSI	Australian Born Resident of Aboriginal or Torres Straits Islander background	0.02 (0.12)
ESB immigrants	English Speaking Background (ESB) Immigrants (Immigrant from the UK and Ireland, USA, Canada, New Zealand, South Africa and Zimbabwe)	0.10 (0.30)
NESB immigrants	Non English Speaking (NESB) Immigrants (Immigrant from countries not covered by 'ESB Immigrant')	0.11 (0.31)
Tenure – Current occupation	Tenure (in years) in current occupation (continuous variable)	8.86 (9.19)
Tenure – Current employer	Tenure (in years) with current employer (continuous variable)	6.51 (7.52)
Years worked	Years worked since finishing full-time education for the first time (continuous variable)	18.62 (11.28)
Years unemployed	Years spent looking for work since finishing full-time education for the first time (continuous variable)	0.48 (1.34)
Years out of the labour force	Years out of the labour force since finishing full-time education for the first time (continuous variable)	2.43 (4.34)
Income, type & hours of work		
Hourly income	Individual hourly income (continuous variable)	20.07 (9.47)
<i>Richer</i>	Hourly income surplus	0.10 (0.19)
<i>Poorer</i>	Hourly income deficit	0.17 (0.22)
Permanent (35–40 h)	Individual on a permanent contract working an average of 35–40 h a week (omitted case)	0.32 (0.47)
Permanent (<35 h)	Individual on a permanent contract working less than 35 h a week on average	0.12 (0.32)
Permanent (>40 h)	Individual on a permanent contract working over 40 h a week on average	0.30 (0.46)
Fixed-term (35–40 h)	Individual on a fixed-term contract working an average of 35–40 h a week	0.04 (0.19)
Fixed-term (<35 h)	Individual on a fixed-term contract working less than 35 h a week on average	0.02 (0.13)
		0.04 (0.19)

Table 1 (continued)

List	Description	Mean/proportion (Standard deviation)
Fixed-term (>40 h)	Individual on a fixed-term contract working over 40 h a week on average	
Casual (35–40 h)	Individual on a casual contract working an average of 35–40 h a week	0.04 (0.18)
Casual (<35 h)	Individual on a casual contract working less than 35 h a week on average	0.11 (0.32)
Casual contract (>40 h)	Individual on a casual contract working over 40 h a week on average	0.02 (0.13)
Workplace characteristics		
Small firm	Individual works for an employer that employs less than 20 people	0.35 (0.48)
Medium sized firm	Individual works for an employer that employs between 20 and 99 people	0.32 (0.47)
Large firm	Individual works for an employer that employs 100 or more people (omitted case)	0.33 (0.47)
Union member	Individual belongs to a union (omitted case—individual does not belong to a union)	0.32 (0.47)
Supervisory responsibilities	Individual's work includes supervising other employees (omitted case—Individual's work does not include supervising other employees)	0.51 (0.50)
Occupation		
Managerial	Individual is employed as a manager	0.11 (0.31)
Professional	Individual is employed as a professional (omitted case)	0.25 (0.43)
Technical trade	Individual is employed as a technician or trade worker	0.13 (0.34)
Personal services	Individual is employed as a community or personal service worker	0.10 (0.30)
Clerical	Individual is employed as a clerical or administrative worker	0.18 (0.38)
Sales	Individual is employed as a sales worker	0.08 (0.27)
Machinery	Individual is employed as a machinery operator or driver	0.07 (0.25)
Labour work	Individual is employed as a labourer	0.10 (0.29)
Industry		
Agriculture	Individual employed in the agriculture, forestry and fishing industry	0.02 (0.14)
Mining	Individual employed in the mining industry	0.02 (0.13)
Manufacturing	Individual employed in the manufacturing industry	0.12 (0.33)
Power	Individual employed in the electricity, gas, water and waste industry	0.01 (0.11)
Construction	Individual employed in the construction industry	0.05 (0.22)
Wholesale trade	Individual employed in the wholesale trade industry	0.04 (0.19)
Retail trade	Individual employed in the retail trade industry	0.09 (0.28)
Hospitality	Individual employed in the accommodation and foodservices industry	0.05 (0.22)
Transport	Individual employed in the transport, postal and warehousing industry	0.05 (0.21)

Table 1 (continued)

List	Description	Mean/proportion (Standard deviation)
Communication services	Individual employed in the information media and telecommunications industry	0.03 (0.17)
Finance	Individual employed in the finance and insurance industry	0.04 (0.20)
Property	Individual employed in rental, hiring and real estate industry	0.01 (0.11)
Technical	Individual employed in the professional, technical and scientific services	0.06 (0.25)
Administration	Individual employed in the administrative and support services	0.02 (0.15)
Public services	Individual employed in the public administration and safety industry (omitted case)	0.09 (0.28)
Education	Individual employed in the education and training industry	0.12 (0.32)
Health	Individual employed in the health care and social assistance industry	0.13 (0.34)
Arts	Individual employed in the arts and recreation services	0.01 (0.12)
Other services	Individual employed in other services	0.03 (0.18)
Geographical location		
City	Individual resides in a major metropolitan area (omitted case)	0.66 (0.47)
Regional	Individual resides in a regional area	0.32 (0.47)
Remote	Individual resides in a rural area	0.02 (0.14)
Family characteristics		
Child at home	Individual has child(ren) at home (omitted case—individual does not have child(ren) at home)	0.62 (0.49)
No dependents at home	Individual has no dependents at home (omitted case—individual has dependents at home)	0.54 (0.50)
Education		
Masters & Ph. D	Individual highest qualification level attained—Masters or Doctorate	0.04 (0.19)
Post-grad. Dip. & Cert.	Individual highest qualification level attained—Post-Graduate Diploma or Certificate	0.07 (0.25)
Degree	Individual highest qualification level attained—Degree	0.17 (0.37)
Diploma	Individual highest qualification level attained—Diploma	0.10 (0.29)
Certificate	Individual highest qualification level attained—Certificate	0.24 (0.42)
Year 12	Individual highest qualification level attained—Completed Year 12 in high school (omitted case)	0.15 (0.36)
Year 11 or less	Individual highest qualification level attained—Completed Year 11 or less	0.24 (0.43)
Survey year		
2001	Data collected in wave 1	0.18 (0.38)
2002	Data collected in wave 2	0.17 (0.37)
2003	Data collected in wave 3	0.17 (0.37)
2004	Data collected in wave 4	0.16 (0.37)
2005	Data collected in wave 5	0.16 (0.37)
2006	Data collected in wave 6 (omitted case)	0.17 (0.37)
Sample size		28039

To test for asymmetry two new variables are created as done by Ferrer-i-Carbonell (2005) and this specification is also presented in the empirical analysis. The purpose of creating these variables is to differentiate respondents with higher income from those with lower income relative to a reference group income. The two new variables, which can be labeled as '*richer*' and '*poorer*' are calculated in the following manner:²

$$\begin{aligned}
 \text{If } I_o > I_r \text{ then } 'richer' &= \ln(I_o) - \ln(I_r) \\
 'poorer' &= 0 \\
 \text{If } I_o < I_r \text{ then } 'richer' &= 0 \\
 'poorer' &= \ln(I_r) - \ln(I_o) \\
 \text{If } I_o = I_r \text{ then } 'richer' &= 0 \\
 'poorer' &= 0
 \end{aligned} \tag{2}$$

To be asymmetric the variable '*poorer*' should be significant and the variable '*richer*' should either be insignificant or significant but with far smaller magnitude compared to that of the '*poorer*'.

Before the main analysis a descriptive summary of variables included in this study is presented in Table 1 and the mean and standard deviation of selected variables at different categories of overall job satisfaction are also shown in Table 2. While the selected variables presented in Table 2 are related to own income and reference group income, the categories used to differentiate overall job satisfaction are low (ratings of 0–4), medium (ratings of 5–7) and high (ratings of 8–10). Looking at the average for all the years (2001–2006), we note from Table 1 that around 48 % of the total sample were female, had a mean age of 38.44 years and worked an average of 18.62 years, of which 8.86 years in their current occupation and 6.51 years with their current employer. On average, employees were earning \$20.07 per hour. The proportion of employees on a permanent contract was 74 %, followed by 17 % on a casual contract and 10 % on a fixed-term contract. By occupation, 25 % were professionals and by industry, 12 % were working in a manufacturing sector. By geographical area, 66 % were living in the city and by family characteristics, 68 % were married or in a de facto relationship, 62 % had at least one child at home and 54 % had no dependents at home. By qualification, around 28 % had been educated to at least degree level.

As can be seen from Table 2 there is a clear indication that overall job satisfaction increases with own income and as the gap between own income and reference group income widens (see the variable for '*richer*'). Overall job satisfaction decreases as the difference between the reference group income and own income increases (see the variable for '*poorer*'). For the variable measuring reference group income (using cell average) there is no apparent relationship with overall job satisfaction. One clear observation is that those who reported higher levels of job satisfaction have lower reference group income, compared to those whose levels of job satisfaction were medium. Overall, the variables presented in Table 2 show that women earn less than men, despite reporting higher overall job satisfaction scores than males. One potential explanation for gender differences in job satisfaction is that male and female workers have different personal and job characteristics. To address this issue a separate regression analysis for each gender is conducted.

² In their paper, Clark et al. (2009) labelled the two variables as *wage surplus* and *wage deficit*.

Table 2 Mean and standard deviation of selected variables at different categories of overall job satisfaction

Selected variables	Overall job satisfaction		
	Low	Medium	High
All (average overall job satisfaction score=7.60)			
Hourly income	18.49 (8.93)*	19.84 (9.17)	20.34 (9.66)
Reference group hourly income	20.03 (4.89)	20.36 (4.89)*	19.91 (4.84)
<i>Richer</i>	0.08 (0.17)*	0.09 (0.18)*	0.11 (0.20)
<i>Poorer</i>	0.21 (0.24)*	0.18 (0.23)*	0.16 (0.22)
Male (average overall job satisfaction score=7.49)			
Hourly income	19.45 (9.93)*	20.89 (10.04)*	22.00 (10.87)
Reference group hourly income	21.33 (5.21)	21.52 (5.40)	21.41 (5.21)
<i>Richer</i>	0.08 (0.19)*	0.10 (0.19)*	0.12 (0.21)
<i>Poorer</i>	0.24 (0.26)*	0.19 (0.24)*	0.17 (0.23)
Female (average overall job satisfaction score=7.71)			
Hourly income	17.25 (7.27)*	18.56 (7.79)	18.71 (7.99)
Reference group hourly income	18.35 (3.85)	18.95 (3.73)*	18.43 (3.59)
<i>Richer</i>	0.07 (0.16)*	0.09 (0.17)*	0.10 (0.19)
<i>Poorer</i>	0.18 (0.16)*	0.16 (0.21)*	0.14 (0.20)

Overall job satisfaction scores are categorized into three: low (ratings of 0–4); medium (ratings of 5–7); and high (ratings 8–10). *, ** and *** denote significantly different from ‘high’ category at 1, 5 and 10 % levels of significance respectively

The Estimation Procedure

Following Clark and Oswald (1996), it is assumed that an individual’s utility (satisfaction) from working can be expressed as:

$$u = u(I_o, h, i, j), \quad (3)$$

where I_o is own income, h is hours of work, i and j are individual and job specific characteristics respectively.³ Similar to the argument that job satisfaction relating specifically to pay may depend not only on worker’s own income but also on relative income, the notion of job satisfaction can be partly determined by relative arguments. This implies that the above model should capture the effect of a general relative utility. So, the complete model of utility from work can be written as:

$$u = u(I_o, h, i, j, E), \quad (4)$$

where E is a vector of comparison level that captures an individual’s income expectations. As stated by Clark (1997), E may come from observation of others, from one’s own experience in the past or from one’s feelings of what one should receive. As already mentioned in “Dataset” of this paper, individual’s income expectations are

³ An individual’s utility (satisfaction) from working is nested in the total utility function, $v = v(u, \mu)$, where v is overall utility, u is utility from work and μ is utility from other aspects of life (e.g., leisure time, family time).

computed using a cell average by age group, gender and education level and denoted as I_r .

In the HILDA data, job satisfaction is measured at an ordinal scale. In this context, the determinants of job satisfaction are usually estimated using ordered probit/logit model. However, such a model has some weaknesses when unobserved time-invariant heterogeneity is important. The conventional ordered probit/logit model usually fails to account for unobserved characteristics and thus suffers a heterogeneity bias.⁴ It is unrealistic to use a conventional random effects ordered probit/logit model assuming zero correlation between the individual's error term and the covariates. In empirical models of job satisfaction, it is likely that job satisfaction depends on various unobserved individual characteristics of the respective employees. And, if these unobserved individual-specific characteristics that influence job satisfaction are related to the observed explanatory variables, the estimates of these explanatory variables will be biased. Thus, it is important to account for unobserved individual heterogeneity. In this paper, this is done using a linear fixed effects model with the assumption that job satisfaction scores are cardinal. Though economists, unlike psychologists and sociologists, are generally reluctant to assume cardinality of ordered responses, the empirical findings presented by Ferrer-i-Carbonell and Frijters (2004) show that it makes almost no difference whether one assumes ordinality or cardinality of general satisfaction questions. The bias from not taking account of time-invariant unobserved factors is more important than from not taking ordinality of responses into account.

The econometric model of job satisfaction has the general form:

$$y_{it} = \alpha_i + \beta'x_{it} + \varepsilon_{it}, \quad i = 1, \dots, N, t = 1, \dots, 6 \quad (5)$$

where y_{it} is overall job satisfaction of employee i at time t . x_{it} —a vector of observable time variant explanatory variables that include, among other things, own income, reference group income, variables for testing asymmetry and year dummies, β' is a vector of estimated parameters, α_i captures unobserved fixed effects (unobserved heterogeneity) and ε_{it} is the remaining error term (or the idiosyncratic errors).⁵

Results

This section reports the coefficients and their accompanying standard errors (adjusted for clusters in reference group income) obtained using a linear fixed effects model. In particular, this section emphasizes the impact that income has on overall job satisfaction. Regression results presented in Table 3, column 1, show that the coefficient on own income is positive and significant but the coefficient on reference group income is (slightly) insignificant, implying that it is own income, rather than relative income, that matters for job satisfaction. However, dividing the sample by gender, the coefficient on own income remains positive and significant for both genders and the

⁴ Some authors consider Mundlak (1978) corrections to control for unobserved time-invariant individual heterogeneity.

⁵ The composite error term $v_{it} = \varepsilon_{it} + \alpha_i$, where α_i is the person-specific time-invariant error term and ε_{it} the idiosyncratic error that varies over individuals and time.

Table 3 Determinants of overall job satisfaction: Linear fixed effects results

Variables	All	Male	Female
Personal characteristics			
Age	0.10 (0.05)***	0.11 (0.13)	-0.12 (0.10)
Age squared/100	0.08 (0.06)	0.13 (0.15)	0.06 (0.07)
Married/de facto	-0.12 (0.05)*	-0.09 (0.06)	-0.17 (0.07)**
Long term health problems	-0.11 (0.04)*	-0.09 (0.04)**	-0.12 (0.06)**
Tenure – Current occupation	-0.03 (0.01)*	-0.03 (0.01)*	-0.02 (0.01)**
Tenure – Current occupation squared/100	0.06 (0.02)*	0.08 (0.02)*	0.04 (0.02)
Tenure – Current employer	-0.06 (0.01)*	-0.05 (0.01)*	-0.08 (0.01)*
Tenure – Current employer squared/100	0.16 (0.03)*	0.12 (0.03)*	0.23 (0.05)*
Years worked	0.08 (0.06)	0.12 (0.10)	0.06 (0.09)
Years worked squared/100	-0.05 (0.06)	-0.13 (0.12)	0.01 (0.09)
Years unemployed	0.85 (0.20)*	0.70 (0.36)***	0.98 (0.26)*
Years unemployed squared	-0.03 (0.02)	-0.01 (0.03)	-0.06 (0.03)**
Years out of the labour force	0.26 (0.13)**	-0.07 (0.24)	0.27 (0.16)***
Years out of the labour force squared	-0.01 (0.01)	0.09 (0.05)***	-0.01 (0.01)
Type & hours of work			
Log hourly income	0.51 (0.05)*	0.50 (0.08)*	0.51 (0.07)*
Log reference group hourly income	-0.37 (0.23)	-0.63 (0.30)**	0.01 (0.33)
Permanent (<35 h)	-0.10 (0.05)**	-0.08 (0.13)	-0.07 (0.06)
Permanent (>40 h)/10	0.68 (0.35)***	0.96 (0.43)**	0.03 (0.50)
Fixed-term (35–40 h)	-0.08 (0.07)	-0.03 (0.09)	-0.14 (0.08)***
Fixed-term (<35 h)	-0.17 (0.12)	-0.31 (0.23)	-0.14 (0.13)
Fixed-term (>40 h)	-0.03 (0.06)	0.04 (0.08)	-0.16 (0.11)
Casual (35–40 h)	-0.17 (0.07)**	-0.23 (0.09)*	-0.16 (0.10)
Casual (<35 h)	-0.31 (0.07)*	-0.66 (0.11)*	-0.17 (0.08)**
Casual (>40 h)	-0.24 (0.11)**	-0.20 (0.13)	-0.32 (0.18)***
Workplace characteristics			
Small firm	0.03 (0.04)	0.08 (0.06)	-0.04 (0.06)
Medium sized firm	-0.04 (0.04)	0.01 (0.05)	-0.12 (0.06)**
Union member	-0.09 (0.04)**	-0.07 (0.07)	-0.13 (0.06)**
Supervisory responsibilities	-0.05 (0.02)***	-0.01 (0.04)	-0.07 (0.04)**
Education			
Masters & Ph. D	0.21 (0.21)	0.49 (0.28)***	-0.21 (0.31)
Post-grad. Dip. & Cert.	0.35 (0.20)***	0.16 (0.25)	0.46 (0.29)
Degree	0.26 (0.18)	0.18 (0.25)	0.27 (0.25)
Diploma	0.14 (0.16)	0.16 (0.19)	0.08 (0.25)
Certificate	0.04 (0.13)	0.02 (0.18)	0.08 (0.19)
Year 11 or less	0.39 (0.16)**	0.37 (0.25)	0.39 (0.22)***
Survey year			
2001	1.15 (0.31)*	1.40 (0.42)*	+
2002	0.88 (0.24)*	1.16 (0.33)*	-0.13 (0.04)*
2003	0.70 (0.18)*	0.86 (0.25)*	0.00 (0.03)

Table 3 (continued)

Variables	All	Male	Female
2004	0.44 (0.13)*	0.57 (0.17)*	-0.05 (0.04)
2005	0.20 (0.07)*	0.23 (0.08)*	-0.01 (0.04)
Observations	28039	14492	13547
Rho	0.86	0.92	0.68

Selected variables only. Values in bracket are standard errors (adjusted for clustering on reference group income). Full results are available on request. Omitted categories are: Not Married/Not in a de facto Relationship; Permanent (35–40 h); Large Sized Firm; Not a Union Member; Has No Supervisory Responsibilities; Year 12; and 2006 (survey year). *, ** and *** denote 1, 5 and 10 % levels of significance respectively. + stands for ‘omitted due to collinearity’

coefficient on reference group income is negative and significant for males, but insignificant for females. This implies that, for males, relative income is an important determinant of job satisfaction alongside own income. Male employees are less satisfied with their overall job if their income is less than that of their reference group. For the male subgroup, a Wald test on the difference between the coefficients of own income and reference group income is performed after the regression and the result ($F(1, 1470)=15.56; p<0.01$) shows that the increase in levels of overall job satisfaction due to an increase in own income is significantly lower than the decrease in levels of overall job satisfaction as a result of increase in reference group income.

In column 1 of Table 4, the coefficients for the variables ‘*richer*’ and ‘*poorer*’, are significant (and opposite in sign) at 10 and 5 % level of significance, respectively. While the job satisfaction level of poorer individuals is negatively influenced by the income of their reference group, richer individuals get more job satisfaction from knowing that their income is above that of their reference group. However, the magnitude of the coefficient on ‘*poorer*’ is relatively higher than that of the ‘*richer*’. Here, a Wald test of the equality of the (‘*richer*’ and ‘*poorer*’) coefficients is performed and the result ($F(1, 136)=4.28; p<0.05$) shows that the loss by the poor (from receiving lower income with respect to their reference group) is significantly greater than the gain by the rich (from receiving higher income with respect to their reference group).

Splitting the sample by gender, the coefficients on ‘*richer*’ and ‘*poorer*’ remain significant for males but insignificant for females. For the male subgroup, both poorer and richer individuals are affected by the income of their reference group, however, a Wald test result ($F(1, 67)=8.31; p<0.01$) reveals that the absolute magnitude of the ‘*poorer*’ coefficient is significantly greater than that of the ‘*richer*’. This implies that income comparisons are asymmetric with an upward comparison dominating downward comparison.

Overall, the results presented in Tables 3 and 4 show that relative income has significant predictive power for males but not for females and income comparisons are asymmetric with more upward effect than downward effect.

The results of the other control variables are standard. Overall job satisfaction is lower for individuals with long-term health problems. Those married or living as a de facto appear to be more satisfied with their overall job. More tenure with respect to

Table 4 Determinants of overall job satisfaction: linear fixed effects results

Variables	All	Male	Female
Personal characteristics			
Age	0.10 (0.05)	0.11 (0.09)	-0.13 (0.09)
Age squared/100	0.08 (0.06)	0.13 (0.11)	0.06 (0.07)
Married / de facto	-0.12 (0.04)*	-0.08 (0.05)***	-0.17 (0.06)*
Long term health problems	-0.11 (0.03)*	-0.09 (0.04)**	-0.12 (0.06)**
Tenure – Current occupation	-0.03 (0.01)*	-0.03 (0.01)*	-0.02 (0.01)**
Tenure – Current occupation squared/100	0.06 (0.01)*	0.08 (0.02)*	0.04 (0.02)**
Tenure – Current employer	-0.06 (0.01)*	-0.05 (0.01)*	-0.08 (0.01)*
Tenure – Current employer squared/100	0.16 (0.03)*	0.12 (0.03)*	0.23 (0.04)*
Years worked	0.08 (0.07)	0.12 (0.09)	0.06 (0.10)
Years worked Squared/100	-0.05 (0.06)	-0.13 (0.10)	0.01 (0.08)
Years unemployed	0.85 (0.22)*	0.69 (0.36)***	0.98 (0.29)*
Years unemployed Squared	-0.03 (0.02)	-0.01 (0.03)	-0.06 (0.03)***
Years out of the labour force	0.26 (0.15)***	-0.06 (0.33)	0.27 (0.19)
Years out of the labour force squared	-0.01 (0.01)	0.09 (0.05)***	-0.01 (0.01)
Type & hours of work			
Log hourly income	0.15 (0.17)	-0.11 (0.22)	0.51 (0.27)***
<i>Richer</i>	0.31 (0.18)***	0.44 (0.21)**	0.08 (0.31)
<i>Poorer</i>	-0.41 (0.18)**	-0.75 (0.23)*	0.07 (0.28)
Permanent (<35 h)	-0.10 (0.05)***	-0.07 (0.14)	-0.07 (0.06)
Permanent (>40 h)/10	0.68 (0.34)**	0.96 (0.43)**	0.03 (0.52)
Fixed-term (35–40 h)	-0.08 (0.06)	-0.03 (0.08)	-0.14 (0.08)***
Fixed-term (<35 h)	-0.17 (0.09)***	-0.30 (0.21)	-0.14 (0.11)
Fixed-term (>40 h)	-0.02 (0.07)	0.04 (0.08)	-0.16 (0.12)
Casual (35–40 h)	-0.17 (0.09)**	-0.23 (0.11)**	-0.16 (0.12)
Casual (<35 h)	-0.30 (0.07)*	-0.64 (0.12)*	-0.18 (0.08)**
Casual (>40 h)	-0.24 (0.12)**	-0.20 (0.14)	-0.32 (0.16)**
Workplace characteristics			
Small firm	0.03 (0.05)	0.08 (0.05)	-0.04 (0.08)
Medium sized firm	-0.04 (0.04)	0.01 (0.05)	-0.12 (0.06)**
Union member	-0.09 (0.04)**	-0.07 (0.06)	-0.13 (0.06)***
Supervisory responsibilities	-0.05 (0.03)***	-0.01 (0.04)	-0.07 (0.03)**
Education			
Masters & Ph. D	0.21 (0.21)	0.48 (0.29)	-0.21 (0.25)
Post-grad. Dip. & Cert.	0.35 (0.20)***	0.15 (0.32)	0.46 (0.23)**
Degree	0.26 (0.17)	0.17 (0.27)	0.27 (0.20)
Diploma	0.14 (0.15)	0.16 (0.21)	0.08 (0.20)
Certificate	0.04 (0.13)	0.02 (0.18)	0.08 (0.17)
Year 11 or less	0.39 (0.15)**	0.37 (0.27)	0.39 (0.19)**
Survey year			
2001	1.15 (0.32)*	1.39 (0.46)*	+
2002	0.88 (0.25)*	1.15 (0.35)*	-0.13 (0.04)*

Table 4 (continued)

Variables	All	Male	Female
2003	0.70 (0.19)*	0.86 (0.27)*	0.00 (0.04)
2004	0.44 (0.13)*	0.57 (0.19)*	-0.05 (0.04)
2005	0.20 (0.07)*	0.23 (0.10)*	-0.01 (0.03)
Observations	28039	14492	13547
Rho	0.86	0.92	0.68

Selected variables only. Values in bracket are standard errors (adjusted for clustering on reference group income). Full results are available on request. Omitted categories are: Not Married/Not in a de facto Relationship; Permanent (35–40 h); Large Sized Firm; Not a Union Member; Has No Supervisory Responsibilities; Year 12; and 2006 (survey year). *, ** and *** denote 1, 5 and 10 % levels of significance respectively. + stands for ‘omitted due to collinearity’

current occupation and employer has a negative impact (in convex manner) on overall job satisfaction. Concerning type and hours of work characteristics, the regression results show that overall job satisfaction is lower for casuals as compared to those with a permanent employment contract and working an average of 35–40 h a week. With respect to workplace characteristics, overall job satisfaction is generally lower for those belonging to a union and those with supervisory responsibilities. For the whole sample and the male subgroup there is a strong indication that overall job satisfaction decreases over time (see the coefficients on survey year). The coefficient

Table 5 Determinants of overall job satisfaction: robustness test

	All	Male	Female	All	Male	Female
A. Linear fixed effects model						
Log hourly income	0.51 (0.05)*	0.50 (0.08)*	0.51 (0.07)*	0.15 (0.17)	-0.11 (0.22)	0.51 (0.27)***
Log reference group hourly income	-0.37 (0.23)	-0.63 (0.30)**	0.01 (0.33)			
<i>Richer</i>				0.31 (0.18)***	0.44 (0.21)**	0.08 (0.31)
<i>Poorer</i>				-0.41 (0.18)**	-0.75 (0.23)*	0.07 (0.28)
B. Linear fixed effects model (dependent variable standardized)						
Log hourly income	0.29 (0.03)*	0.28 (0.05)*	0.29 (0.04)*	0.08 (0.10)	-0.06 (0.12)	0.29 (0.15)***
Log reference group hourly income	-0.21 (0.13)	-0.35 (0.17)**	0.01 (0.19)			
<i>Richer</i>				0.17 (0.10)***	0.25 (0.12)**	0.04 (0.18)
<i>Poorer</i>				-0.23 (0.10)**	-0.42 (0.13)*	0.04 (0.16)

For brevity robustness check results are shown only for the income variables. Full results are available on request. Empty cells refer to variables not included in the model. Values in bracket are standard errors. *, ** and *** denote 1, 5 and 10 % levels of significance respectively

on rho (the intraclass correlation) suggests that a large percentage of the variation in the dependent variable is related to individual differences in job satisfaction levels. The strength of this correlation is higher in males than females.

In this study, a robustness check is performed using the same procedure (a linear fixed effects model) after standardizing the ordinal rankings of the dependent variable by subtracting its mean and dividing by its standard deviation. This approach produces results very consistent with our approach (see Table 5).⁶

Discussion

A vast number of literatures have given considerable attention to the importance of relative income in determining job satisfaction. Most research findings suggest that not only the absolute level of an individual's income is important, but also his/her relative income position in the income hierarchy. Employees are less satisfied with their jobs when the income level of their reference group is higher and vice versa. However, this does not indicate whether or not income comparisons are asymmetric. Do the poorer individuals lose by relative comparisons more than what the richer individuals gain from knowing their income is above that of their reference group? To analyze the importance of relative income in determining job satisfaction and test for asymmetry of income comparisons, a reference group income is constructed using cell average income by age group, gender and education level.

Findings from this study show that own income has a positive effect on overall job satisfaction. With regard to the effect that reference group income has on overall job satisfaction, the findings appear to be a big gender difference, with a significant predictive power for males but not for females. For males, a log increase in reference group hourly income (approximately \$2.72) decreases overall job satisfaction by 0.64 point (on a 0–10 scale) and a log increase in own hourly income increases overall job satisfaction by 0.50 point.

The test result for asymmetry support Duesenberry's hypothesis that income comparisons are asymmetric. The findings for the total sample and the male subgroup indicate that the overall job satisfaction level of poorer (richer) people is negatively (positively) affected by the income of richer (poorer) members of their reference group. For the male subgroup, the overall job satisfaction level of poorer individuals decreases by 0.76 point as a result of knowing that their income is below that of their reference group. On the other hand, the overall job satisfaction level of richer people increases by only 0.45 point as a result of knowing that their income is above that of their reference group. A statistical test that these coefficients are equal is rejected, implying that comparisons are asymmetric with gains from earning more than the

⁶ Though the absolute magnitude of the coefficients in both models (A and B) in Table 5 is different, the estimated coefficient ratios of A as well as the ratios of B are very close. For the male subgroup for instance, the ratio of *richer/poorer* ($0.44/-0.75$)= -0.59) in model A is very close to the ratio of *richer/poorer* ($0.25/-0.42$)= -0.60) in model B.

reference group being significantly less than the loss from earning less than the reference group. This is consistent with the findings of Wunder and Schwarze (2006), slightly different from that of Boyce et al. (2010) and Ferrer-i-Carbonell (2005), and totally different from that of Mayraz et al. (2010), McBride (2001) and D'Angelo and Zazzaro (2009).

Limitations

The findings in this paper should be viewed in light of the study's limitations. There is one important limitation with regard to a reference group worth mentioning. Finding a relevant reference group against which individuals compare their income with is a challenge (Deaton 2003). Though many still believe that constructing a reference group by age, gender and education level is favourable as it takes account of people similar in social characteristics, it is valid to presume individuals in the same group might have different motives and thus the reference group set might not reflect their choices (Clark et al. 2008; Falk and Knell 2004). It is also possible that individuals who have concern for status may choose a lower-income reference group and those who have concern for signal may choose a higher-income reference. Further, individuals can inherently have a pessimistic or optimistic attitude, and this may affect their decision in choosing the reference group with whom they compare themselves (de la Garza et al. 2010). It is also reasonable to assume that people often have multiple comparisons. They might compare themselves to their neighbours, to colleagues, to friends, and to those with whom they directly interact (Deaton 2003).

Conclusion

This paper examines the link between relative income and overall job satisfaction using data drawn from the first six waves of the HILDA Survey. Results from the linear fixed effects model indicate that the overall job satisfaction of men is significantly negatively correlated with their relative income, but that is not the case with women. There is some gain in job satisfaction for richer individuals who earn above that of their reference group but the loss is high for poorer individuals who earn below that of their reference group. This indicates that comparisons are asymmetric and upward. This can be considered as a signal that the monetary evaluation of the market is inappropriate (Wunder and Schwarze 2006).

The results presented in this paper have important policy implications regarding income redistribution and tax reform. However, before recommending any policy issue a further study that looks separately at those earning above and below the reference group income is essential to get more information on how certain socio-economic and demographic variables vary accordingly. In addition, it is important to apply various definitions of reference groups and see how results differ in view of that. Nevertheless, one important point worth mentioning is that an economic reform aiming at increasing absolute income without considering relative income may have little impact on job satisfaction.

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